SIEMENS

ACOM.net Server VC20A

[redacted] AX

DICOM Conformance Statement

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Network Conformance Statement

1 Introduction

1.1 Overview

The Conformance Statement describes the DICOM interface for the Siemens ACOM.net Server DICOM application in terms of part 2 of [DICOM].

This introduction describes the application's implemented DICOM functionality in general terms.

1.2 Scope and Field

The Siemens product ACOM.net Server is a dedicated Archive for storing of Images in Cardiology Solution environment. The ACOM.net Server is designed to be integrated with the dedicated Siemens clients (e.g. ACOM.PC 5.0) and general DICOM clients. ACOM.net Server supports the storage of images utilizing the DICOM "Storage Service Class" and "Storage Commitment Push Model Service Class", the retrieval of Images from the Server utilizing the DICOM "Query/Retrieve Service Class" for foreign DICOM systems. Furthermore DICOM Media File Instances can be created on (remote) online file-systems. The ACOM.net Server's implementation is "*syngo*®-based"[a].

1.3 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

1.4 Remarks

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality as SCU and SCP, respectively.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with Siemens and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM 3.0 Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between Siemens and non-Siemens equipment.
- Test procedures should be defined and tests should be performed by the user to validate the connectivity desired. DICOM itself and the conformance parts do not specify this.
- The standard will evolve to meet the users' future requirements. Siemens is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

[a] *syngo* is a registered trademark of Siemens AG

- Siemens reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens representative for the most recent product information.

1.5 Definitions, Terms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard. Furthermore the following definitions are applicable in this document:

Near-line storage - Doing a save-copy from online storage onto Archive-System (e.g. MOD-/ CDR-Jukebox). Needs to be copied back to online storage before access via DICOM Standard Interface is possible.

Online storage - Images immediately accessible on an online RAID-cluster

Offline storage - An archive medium containing the Images exists, but is removed from the near-line storage and therefore access is only possible via operator interaction.

Additional Abbreviations and terms are as follows:

ACR	American College of Radiology
AE	DICOM Application Entity
ASCII	American Standard Code for Information Interchange
CSE	Customer Service Engineer
DB	Database
DCS	DICOM Conformance Statement
DSA	Digital Subtraction Angiography
IOD	DICOM Information Object Definition
ISO	International Standard Organization
NEMA	National Electrical Manufacturers Association
O	Optional Key Attribute
PDU	DICOM Protocol Data Unit
R	Required Key Attribute
RIS	Radiology Information System
RWA	Real-World Activity
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM Server)
SOP	DICOM Service-Object Pair
U	Unique Key Attribute

1.6 References

[DICOM] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.14, 2001

1.7 Structure

The ACOM.net Server Conformance Statement is subdivided into two Parts, which relate to individual documents needed to declare Conformance according to the requirements of "Part 2 - Conformance" of the DICOM Standard.

Those parts are:

- "DICOM Conformance Statement" for Network related Services
- A general Annex.

2 Implementation Model Verification

The ACOM.net Server DICOM Service Tool application requests Verification to verify the ability of a foreign DICOM application on a remote node to respond to DICOM messages.

Responding to Verification requests from remote nodes is handled by the Storage SCP application.

2.1 Application Data Flow Diagram

The ACOM.net Server DICOM network implementation is a Windows NT application and acts as SCU for the C-ECHO DICOM network service.

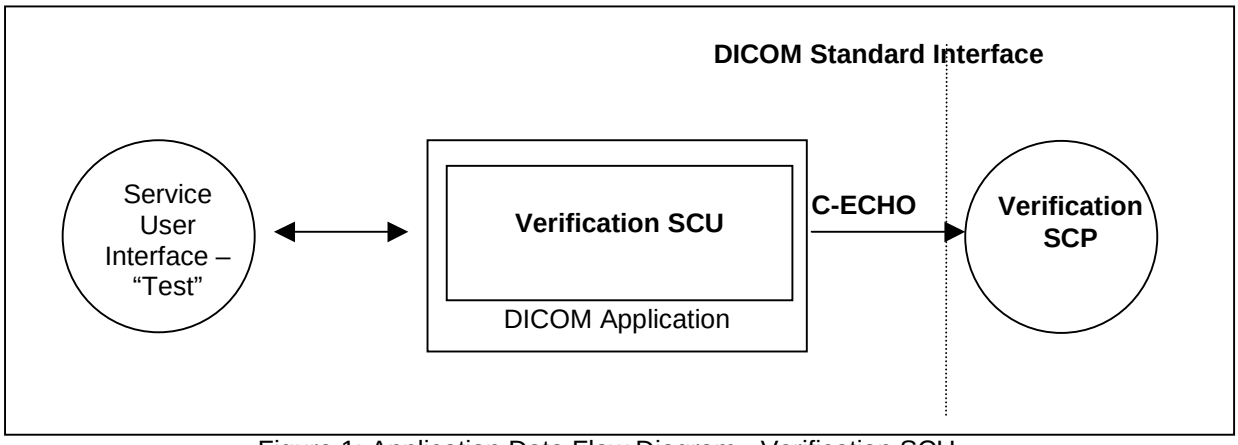


Figure 1: Application Data Flow Diagram - Verification SCU

2.2 Functional Definitions of Applications

The ACOM.net Server DICOM Service Tool application opens an association when a "Test" of a remote application is requested during a configuration session. This can be done when entering new data for remote application configuration or to verify existing configuration data.

2.3 Sequencing of Real-World Activities

Newly entered data have to be saved first, before a "Test" of these data is possible.

3 Application Entity Specification Verification

3.1 Verification AE Specification

3.1.1 Association Establishment Policies

3.1.1.1 General

The ACOM.net Server DICOM Service Tool application attempts to open an association for verification request whenever the "Test" function is activated during network configuration of a remote DICOM application.

3.1.1.2 Number of Associations

The ACOM.net Server DICOM Service Tool application initiates one association at a time to request verification.

The ACOM.net Server supports a configuration value for "Simultaneous DICOM Associations" accepted/running in parallel at one time. The default value is 40, the permissible range is 10 to 100.

3.1.1.3 Asynchronous Nature

The ACOM.net Server DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

3.1.1.4 Implementation Identifying Information

Implementation Class UID	1.3.12.2.1107.5.4.11.1.1.42
Implementation Version Name	“ACOMNET_VC20A"

3.1.2 Association Initiation Policy

The ACOM.net Server DICOM Service Tool application attempts to initiate a new association for

- DIMSE C-ECHO

service operations.

3.1.2.1 Associated Real-World Activity

3.1.2.1.1 Associated Real-World Activity – Request Verification “Test”

The associated Real-World activity is a C-ECHO request initiated by Service and Configuration SW environment whenever a "Test" is requested. If an association to a remote Application Entity is successfully established, Verification with the configured AET is requested via the open association. If the C-ECHO Response from the remote Application contains a status other than "Success" this will be indicated in the service environment and the association is closed.

3.1.2.1.2 Proposed Presentation Contexts

The ACOM.net Server DICOM application will propose Presentation Contexts as shown in the following table:

Presentation Context Table – Verification SCU					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None

3.1.2.1.3 SOP Specific Conformance – Verification SCU

The Application conforms to the definition of the Verification SCU in accordance to the DICOM Standard.

3.1.3 Association Acceptance Policy

The Verification SCP is part of the Storage SCP – see section 5.1.3.

4 Implementation Model Storage

The ACOM.net client modalities use the ACOM.net server as online- and near-line-storage for DICOM IODs. The ACOM.net clients will access those IODs with the help of the ACOM.net protocol. All DICOM IODs of the supported SOP classes that are sent to the ACOM.net Server will be forwarded to near-line storage through online storage and can then be accessed by all ACOM.net clients connected. Other DICOM clients will only be possible to retrieve instances from online storage.

Sending of DICOM IODs can only be initiated via DICOM standard interface, which is in particular the receiving of a C-MOVE request. Furthermore the Archive Manager can be configured to forward any Standard SOP Instance to a network destination if archival on long-term storage is permissible for this Instance.

4.1 Application Data Flow Diagram

The ACOM.net DICOM network implementation is a Windows 2003 Server application on the ACOM.net server and acts as SCP for the C-STORE and C-ECHO DICOM network services. DICOM IOD SOP instances received by the ACOM.net server will be stored online and then are being forward to the long-term storage of the server. Via ACOM.net protocol interface the ACOM.net clients can access those SOP Instances[a] sent to the Server from other DICOM modalities. Other Modalities can access the SOP Instances in online storage via DICOM Standard Interface (Query/Retrieve). When configured, the Archive-Manager can decide to "auto-forward" received SOP Instances to (a) secondary DICOM Archive(s) (up to 3 destinations are supported).

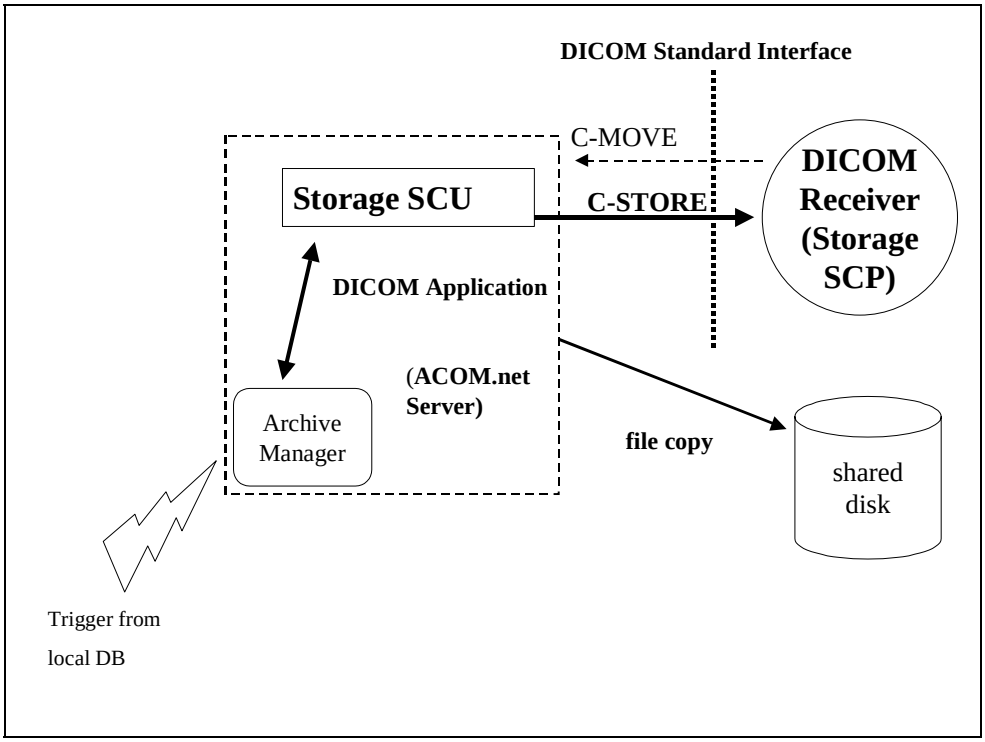


Figure 2: Application Data Flow Diagram – “auto-transfer” / Send image (retrieve) - Storage SCU

[a] Not all type of images received by the ACOM.net Server can be displayed with the clients. Please see other section of this DCS to learn more about applicable restrictions.

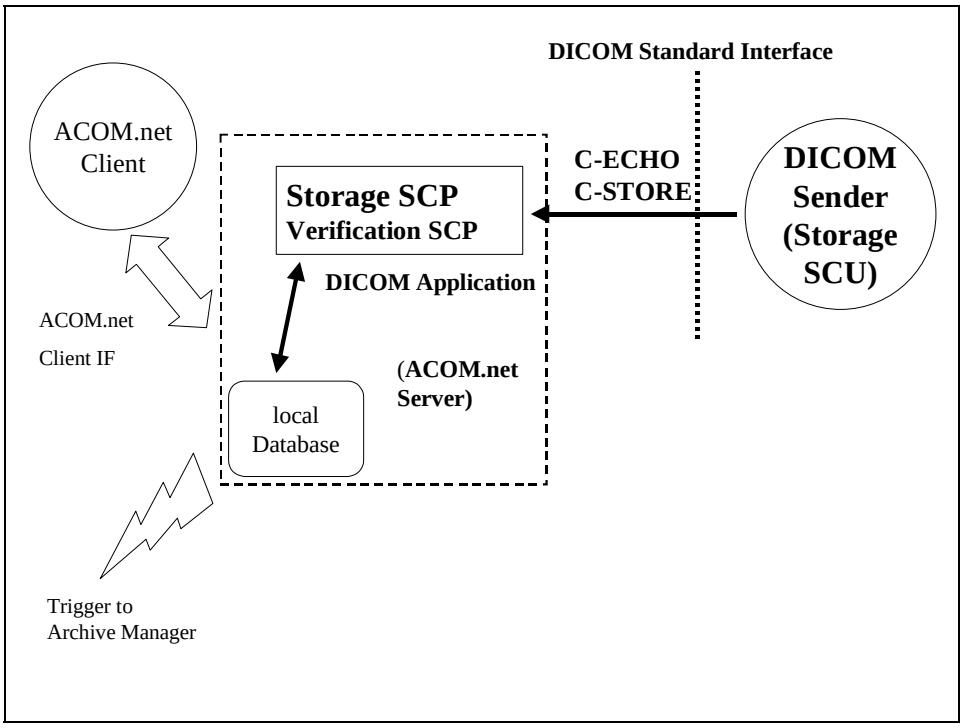


Figure 3: Application Data Flow Diagram – Storage SCP

4.2 Functional Definitions of Application Entities

The Storage SCU is invoked by the DICOM application itself as a sub-operation of a C-MOVE retrieve service. An association is negotiated with the destination application entity and the image data is transferred using the C-STORE DIMSE-Service. Status of the transfer is reported to the job control interface.

If activated by configuration, the Archive Manager can "auto-forward" received Instances (either from ACOM.net clients or by DICOM SCP or when transferred from near-line storage back to online storage by ACOM.net client activity) to a "secondary" DICOM Archive. Either the DICOM Send mechanism is then used to transfer the Images or a file-copy as a DICOM Part 10 file. Up to three different destinations can be configured and will then be addressed in parallel.

The Storage SCP component of the ACOM.net Server DICOM application is operating as background server process. It is existing when the machine is powered on and waits for Storage association requests. Upon accepting an association with a negotiated Presentation Context it starts to receive the Composite Image Objects and imports them to local database ("Online Storage"). Transfer of images between ACOM.net client and server is based on standard DICOM Storage service.

Verification requests will be processed and responded by Storage SCP component too.

4.3 Sequencing of Real-World Activities

Only SOP Instances that are granted for storage on the long-term archive device and, optionally, those that are transferred back from long-term archive, can be send or copied as DICOM file by the "auto-forward" function. This "auto-forward" will occur immediately after the images have been received and checked for long-term archival capability or after being transferred back to “online storage”. Time of transfer depends on the load of the auto-forward queue. The time of transfer from online to near-line storage is not correlated to this "auto-forward" activity.

Only SOP Instances from online storage can be retrieved/sent.

5 Application Entity Specification Storage

5.1 Storage AEs Specification

The ACOM.NET Server Storage service class user/service class provider applications use one AE when initiating/receiving associations to/from remote DICOM nodes.

ACOM.NET Server DICOM products provide Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

SOP Class Name	SOP Class UID
Nuclear **M**edicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ultra**S**ound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Ultra**S**ound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary **C**apture Image Storage	1.2.840.10008.5.1.4.1.1.7
X-Ray **A**ngiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1

Supported SOP Classes as Storage SCU

ACOM.NET Server DICOM products provide Private Conformance to the following DICOM V3.0 conform private SOP Classes as an SCU:

SOP Class Name	SOP Class UID
Syngo Non-Image Storage	1.3.12.2.1107.5.9.1

Supported private SOP Classes as Storage SCU

ACOM.NET Server DICOM products provide Standard Conformance to the following DICOM V3.0 SOP Class as an SCP:

SOP Class Name	SOP Class UID
Nuclear **M**edicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ultra**S**ound Multi-Frame Image Storage (retired)[a]	1.2.840.10008.5.1.4.1.1.3
Ultra**S**ound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Ultra**S**ound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6
Ultra**S**ound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary **C**apture Image Storage	1.2.840.10008.5.1.4.1.1.7
X-Ray **A**ngiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
Verification	1.2.840.10008.1.1

Supported SOP Classes as Storage SCP

[a] US Retired and US multi-frame Retired images are converted to US Images/US multi-frame Images before storing them into the local database. The conversion creates new images, which implies new UIDs.

ACOM.NET Server DICOM products provide Private Conformance to the following DICOM V3.0 conform private SOP Class as an SCP:

SOP Class Name	SOP Class UID
Syngo Non-Image Storage	1.3.12.2.1107.5.9.1

Supported private SOP Classes as Storage SCP

5.1.1 Association Establishment Policies

5.1.1.1 General

When configured, the Archive Manager will trigger the Storage Application (SCU Component) to perform a DICOM Send operation for every SOP Instance that is "ready for long-term Storage". Up to three different destinations can be configured and operated in parallel. To each destination an association request is sent and upon successful negotiation, the transfer is started. SOP Instances received with compressed Transfer Syntax, will be transmitted "as is", which means no conversion of Transfer Syntax (i.e. Decompression) can be performed due to result of Transfer Syntax negotiation.

Furthermore, upon receiving of a C-MOVE request, the ACOM.net Server DICOM application will activate the DICOM Storage Application. An association request is sent to the destination AE and upon successful negotiation of a Presentation Context the transfer is started.

The default PDU size used will be 256 KB.

5.1.1.2 Number of Associations

The ACOM.net Server DICOM application initiates several associations at a time, one for each destination to which a transfer request is being processed due to an active C-MOVE operation or an Archive Manager auto-transfer request is being processed.

The ACOM.net Server supports a configuration value for "Simultaneous DICOM Associations" accepted/running in parallel at one time. The default value is 40, the permissible range is 10 to 100.

5.1.1.3 Asynchronous Nature

The ACOM.net Server DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

5.1.1.4 Implementation Identifying Information

Implementation Class UID	1.3.12.2.1107.5.4.11.1.1.42
Implementation Version Name	“ACOMNET_VC20A"

5.1.2 Association Initiation Policy

If a send request with network destination gets active (either triggered by a previous C-Move or by Archive manager "auto-forward"), the Siemens ACOM.net Server DICOM application attempts to initiate a new association for

- DIMSE C-STORE

service operations.

5.1.2.1 Associated Real-World Activity

5.1.2.1.1 Associated Real-World Activity – Archive manager "auto-transfer"

The associated Real-World activity is a C-STORE request initiated by an internal daemon process triggered by Archive Manager requests. If the process successfully establishes an association to a remote Application Entity, it will transfer each image one after another via the open association. If the C-STORE Response from the remote Application contains a status other than Success or Warning, the association is aborted.

It depends on the Archive Manager and related availability of Object Instances, if more than one Instance is transferred via an open association.

5.1.2.1.2 Proposed Presentation Contexts – "auto-transfer"

The ACOM.net Server DICOM application will propose Presentation Contexts depending on configuration of a DICOM destination. The following table lists a "maximum configuration":

Presentation Context Table – "auto-transfer"					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
any of the Storage SOP Classes in section 5.1 Table: "Supported SOP Classes as Storage SCP" ***2**		JPEG Lossy Extended ***1**	1.2.840.10008.1.2.4.51	SCU	None
		JPEG Lossless, Process 14 (selection value 1)	1.2.840.10008.1.2.4.70		
		JPEG Lossy Baseline (Process 1) ***1**	1.2.840.10008.1.2.4.50		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Implicit VR Little Endian	1.2.840.10008.1.2		

***1**: The Transfer Syntax used is strongly influenced by the fact of "how was the accepted Transfer Syntax at the time when the Instance was received". e.g. the Instances received with JPEG Baseline Transfer Syntaxes will not be converted and can only be sent out with the same Transfer Syntax.

***2**: The US (retired) and US multi-frame (retired) Images will never be proposed, since those instances will be converted to US and US multi-frame during receive.

5.1.2.1.3 SOP specific Conformance – "auto-transfer"

The ACOM.net Server itself will NOT create any DICOM IOD instances other from those sent to the server or created by the clients connected to it via ACOM.net client interface. Please see Annex for a detailed overview of supported attributes and minimal requirements regarding value encoding. Only Instances successfully received by the ACOM.net Server and fulfilling the conditions for long-term storage transfers (online-to-nearline or nearline-to-online), can be sent out via "auto-forward".

5.1.2.1.4 Associated Real-World Activity - Send Image Objects to a Network destination

The associated Real-World activity is a C-STORE sub-operation as part of processing a received C-MOVE request. The C-STORE will be directed to a destination node specified by the "move destination" attribute. If the process successfully establishes an association to the remote Application Entity, it will transfer each image one after another via the open association. If the C-STORE Response from the remote Application contains a status other than Success or Warning, the association is aborted.

5.1.2.1.5 Proposed Presentation Contexts - Send Image

The ACOM.net Server DICOM application will propose Presentation Contexts depending on configuration of a DICOM destination. The following table lists a "maximum configuration":

Presentation Context Table – “auto-transfer”					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
any of the Storage SOP Classes in section 5.1 Table: "Supported SOP Classes as Storage SCP" ***2**		JPEG Lossy Extended ***1** JPEG Lossless, Process 14 (selection value 1) JPEG Lossy Baseline (Process 1) ***1** Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None
Syngo Non-Image Storage	1.3.12.2.1107.5.9.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None

***1:** The Transfer Syntax used is strongly influenced by the fact of "how was the accepted Transfer Syntax at the time when the Instance was received". e.g. the Instances received with JPEG Lossy Transfer Syntaxes will not be converted and can only be sent out with the same Transfer Syntax.
***2**: The US (retired) and US multi-frame (retired) Images will never be proposed, since those instances will be converted to US and US multi-frame during receive.

The “MOVE destinations” must be configured as Storage destinations. This would include the configuration of Transfer Syntax capabilities.

5.1.2.1.6 SOP Specific Conformance - Send Image

The ACOM.net Server itself will NOT create any DICOM IOD instances other from those sent to the server or created by the clients connected to it via the ACOM.net client interface. Please see Annex for a detailed overview of supported attributes and minimal requirements regarding value encoding.

5.1.2.1.6.1 Optional Attributes

Data Dictionary of DICOM Type 2 and 3 IOD Attributes

Please refer to the related sections in the "Association Acceptance Policy" chapter and the Annex of this DCS. Type 3 Attributes with zero length may be removed. Obsolete Spaces may be stripped from attribute values.

5.1.2.1.6.2 Specialized Information Object Definitions

The ACOM.net server is capable of handling the "Syngo Non-Images" specialized by other SIEMENS modalities.

Furthermore storage of private attributes is supported and therefore extended IOD Instances can be retrieved from the ACOM.net Server DICOM Application.

5.1.2.1.6.3 Image Pixel Attribute Description for Monochrome Images

Please refer to the related sections in the "Association Acceptance Policy" chapter and the Annex of this DCS. Since the ACOM.net server does not create Instances itself, the format of images sent is determined by the contents of the images successfully received by the ACN Server or created by the ACOM.net clients.

5.1.2.1.6.4 Image Pixel Attribute Description for Color Images

The ACOM.net Server platform is supporting specific "YBR..." photometric interpretations during image receive process, but those instances will be converted to RGB for further handling.

5.1.2.1.7 Associated Real-World Activity - Archive Manager "file-copy"

The associated Real-World activity is creation of a DICOM Part 10 File (DICOM Meta File), initiated by an internal daemon process triggered by Archive Manager requests. The SOP Instances are created on the configured file share by using the same Transfer Syntax as to the time when the Image was received.

There will be no creation or update of a DICOMDIR Instance on the specified file set.

5.1.2.1.8 Proposed presentation Contexts – Archive Manager "file-copy"

Since this is a file copy of a DICOM Part 10 File instance, there is no negotiation of Presentation Context. The application will encode the DICOM Object in the same Transfer Syntax as it was applied by the sender -according to association negotiation results- at the time the image was received.

5.1.2.1.9 SOP specific conformance – Archive Manager "file copy"

Same rules as for "auto-transfer" apply. Please see related section (5.1.2.1.3 SOP-specific Conformance - "auto-transfer").

5.1.3 Association Acceptance Policy

The ACOM.net Server DICOM application attempts to accept a new association for

- DIMSE C-ECHO
- DIMSE C-STORE

service operations. Any Information Objects transmitted on that association will be checked on conformance and stored in database if check was successful.

The ACOM.net Server supports a configuration value for "Simultaneous DICOM Associations" accepted/running in parallel at one time. The default value is 40, the permissible range is 10 to 100.

5.1.3.1 Associated Real-World Activity

5.1.3.1.1 Associated Real-World Activity – Receiving Images from a Remote Node

The ACOM.net Server DICOM application will accept an association and will receive images according to the below listed presentation contexts on that association and will store the images on disk in the ACOM.net server online storage if the conformance check is performed successfully.

5.1.3.1.2 Accepted Presentation Context – Receive Image

The ACOM.net Server DICOM application will accept Presentation Contexts as shown in the following table:

Presentation Context Table – "auto-transfer"					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
any of the Storage SOP Classes in section 5.1 Table: "Supported SOP Classes as Storage SCP" ***2**		JPEG Lossy Extended JPEG Lossless, Process 14 (selection value 1) JPEG Lossy Baseline (Process 1) RLE Lossless ***1** Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.5 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCP	None
Syngo Non-Image Storage	1.3.12.2.1107.5.9.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Verification	1.2.840.10008.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

***1:** The RLE Lossless Transfer Syntax is only supported for certain US photometric interpretations. Instances with RLE Lossless Transfer Syntax will always be uncompressed prior to permanent storage.
***2**: The US (retired) and US multi-frame (retired) Images will be accepted, but are converted to US and US multi-frame prior to permanent storage. New SOP Instance UIDs will be created in this case.

5.1.3.1.3 SOP-specific Conformance Statement – Receive Image

The ACOM.net Server DICOM application is a "Level **2**" Storage Class Provider.

Upon successful receiving a C-STORE-RQ, the Siemens ACOM.net Server DICOM receiver performs a quick plausibility test on the received image and available system resources. If this test succeeds, it returns the status SUCCESS (0000_H), otherwise one of the following status codes is returned and the association is aborted:

- Refused ($A700_H$):
  This error status indicates a lack of Resources (e.g. not enough disk space) on the ACOM.NET Server modality.
- Invalid Dataset ($A900_H$):
  The dataset is not containing one of the Attributes “Study Instance UID”, “Series Instance UID” or “SOP Instance UID”, or one of them has an invalid value.
- Error (0110_H):
  An error occurred while processing the image, which makes it impossible to proceed.

Attention! Only after sending the positive status response, the image will be saved into the database. If during this operation an error occurs, the association will be aborted. This implies that a C-STORE-RSP with status SUCCESS does not necessarily mean that the image was successfully stored into the database.

In order to confirm that the sent images where successfully stored in the database, the sending application should use Storage Commitment Service.

If an image instance is received that is identified by a SOP Instance UID that is already used by an Instance stored in database, then the actual received image will be discarded.
The existing Instance is not superseded.

For Private Attributes of VR=SQ only a nesting level of one is supported. This means that Private Sequences containing another Sequence will get removed from the image. Furthermore private attributes will only be supported with Explicit VR Transfer syntaxes. Private Attributes in Standard Sequence items will generally not be supported and the private data are removed from the related items in the image header.

The ACOM.net Server application supports retired Date and Time-Format when receiving Instances. The displayed format of Date/Time in the ACOM.net Client Applications is outside the scope of this DCS.

5.1.3.1.3.1 Mandatory Attributes acceptance criterion

Upon receiving an IOD a check for attributes, mandatory to the ACOM.net Server implementation, is done and with successful completion the IOD is accepted for storage. In case of unsuccessful check results, the IOD will be rejected with Error status. Some Type 2 attributes require appropriate values to assure image display of those IOD’s even though storage would be possible with zero length.

Attributes for minimal acceptance criterion will be listed - sorted by individual IOD Type - in the Annex tables.

5.1.3.1.3.2 Optional Attributes acceptance criterion - applied defaults

Upon receiving an IOD a check for optional attributes is done. During check, defaults will be set, depending on the specific IOD rules, whenever certain optional attributes are encountered to be absent from the object instance. Please see the following table for details:

Attribute Name	Tag	Default Value
Study Date	(0008,0020)	<unknown, zero length>
Image Date	(0008,0023)	<unknown, zero length>
Study Time	(0008,0030)	<unknown, zero length>
Image Time	(0008,0033)	<unknown, zero length>
Accession Number	(0008,0050)	<unknown, zero length> (can be changed via ACOM.net client unless in long-term storage)
Manufacturer	(0008,0070)	<unknown, zero length>

Attribute Name	Tag	Default Value
Referring Physician's Name	(0008,0090)	<unknown, zero length>
Study Description	(0008,1030)	<unknown, zero length>
Patient's Name	(0010,0010)	<unknown, zero length> (can be changed via ACOM.net client unless in long-term storage)
Patient ID	(0010,0020)	<unknown, zero length> (can be changed via ACOM.net client unless in long-term storage)
Patient's Birth Date	(0010,0030)	<unknown, zero length> (can be changed via ACOM.net client unless in long-term storage)
Patient's Sex	(0010,0040)	<unknown, zero length> (can be changed via ACOM.net client unless in long-term storage)
Patient Comments	(0010,4000)	<value (only when entered via ACOM.net client)>
Contrast/Bolus Agent	(0018,0010)	<unknown, zero length>
KVP	(0018,0060)	<unknown, zero length>
Counts Accumulated	(0018,0070)	<unknown, zero length>
Exposure Time	(0018,1150)	<unknown, zero length>
X-Ray Tube Current	(0018,1151)	<unknown, zero length>
Positioner Primary Angle	(0018,1510)	<unknown, zero length>
Positioner Secondary Angle	(0018,1511)	<unknown, zero length>
Study ID	(0020,0010)	<unknown, zero length> (can be changed via ACOM.net client unless in long-term storage)
Series Number	(0020,0011)	<unknown, zero length>
Image Number	(0020,0013)	<unknown, zero length>
Patient Orientation	(0020,0020)	<unknown, zero length>
Pixel Spacing	(0028,0030)	<unknown, zero length>
Window Center	(0028,1050)	internal default: Window Width / 2
Window Width	(0028,1051)	internal default: calculated from "Bits Stored"
Recommended Viewing Mode	(0028,0102)	<unknown, zero length>
Representative Frame Number	[0028,6010]	number of frames / 2
Calibration Image	(0050,0004)	<unknown, zero length>
Energy Window Information SQ	(0054,0012)	<unknown, zero length>
Detector Information SQ	(0054,0022)	<unknown, zero length>
Rotation Information SQ	(0054,0052)	<unknown, zero length>
Patient orientation Code SQ	(0054,0410)	<unknown, zero length>
Patient Gantry Relationship Code SQ	(0054,0414)	<unknown, zero length>

Applied Defaults Dictionary of DICOM type 2 and 3 IOD Attributes

5.1.3.1.4 Presentation Context Acceptance Criterion

The ACOM.net Server DICOM application will accept any number of verification or storage SOP classes that are listed above. There is no limit on the number of presentation contexts accepted except to the DICOM limitations. In the event that the ACOM.net Server DICOM application runs out of resources, it will reject the association request.

5.1.3.1.5 Transfer Syntax Selection Policies

The ACOM.NET Server DICOM application currently supports

- the Implicit VR Little Endian, the Explicit VR Little Endian and Explicit VR Big Endian Transfer Syntaxes
- the JPEG Lossless Non-hierarchical Transfer Syntax

- the JPEG Baseline and JPEG Extended Transfer Syntaxes (JPEG Lossy).
- the RLE Lossless Transfer Syntax

Any proposed presentation context including one of these Transfer Syntaxes will be accepted. Any proposed presentation context that does not include one of these Transfer Syntaxes will be rejected.

The order of preference in accepting Transfer Syntaxes within Presentation Contexts or Presentation Contexts with single Transfer Syntaxes is:

1. JPEG Lossy Extended
2. JPEG Lossless Non-hierarchical
3. JPEG Lossy Baseline
4. RLE Lossless
5. Explicit VR Little Endian
6. Explicit VR Big Endian
7. Implicit VR Little Endian

With RLE Lossless Transfer Syntax the ACOM.net Server DICOM application will decompress the image before storing it into the database.

With Implicit VR Little Endian Transfer Syntax the ACOM.NET Server DICOM application will remove any Private Attributes not known to the application. Decision on removal of a Private Element is done if there is NO entry in the attribute-dictionary of the ACOM.NET Server DICOM application.

Therefore any Explicit VR Transfer Syntax shall preferably be used by the Storage SCU's when sending Composite Image Instances to the ACOM.NET Server DICOM application.

6 Implementation Model Storage Commitment

The Storage Commitment service class defines an application-level class of service which facilitates the commitment to storage. It performs an additional task of commitment of composite objects apart from the network based storage of images as defined by the Storage Service class. The ACOM.net Server DICOM implementation supports the Storage Commitment Push Model as SCP.

6.1 Application Data Flow Diagram

The ACOM.net Server DICOM network implementation acts as SCP for the Storage Commitment Push Model Service using the Storage Commitment Service Class. The product target Operating System is Windows 2003 Server.

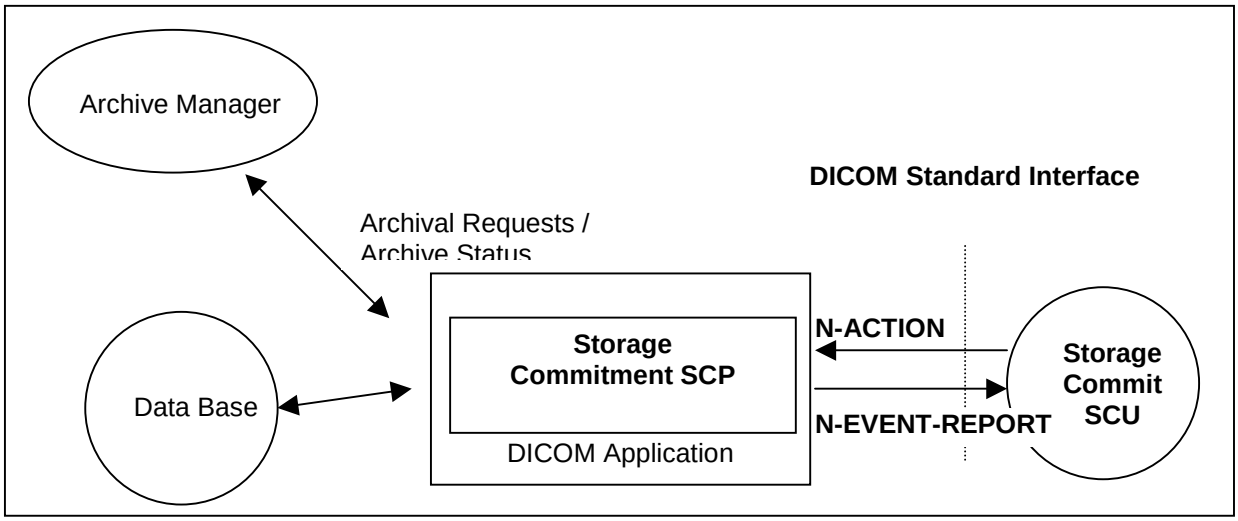


Figure 3: Application Data Flow Diagram – Storage Commitment SCP

6.2 Functional Definitions of Application Entities

The Storage Commitment SCP is running in background and is ready to receive request when the system is started.

The accepted Commitment requests will be kept in a "pending queue" for 24h until archival of related instances occurred. Consecutive to Archival time, -during "Response Time Span"- the server application regularly checks the pending queue for commit requests that are “ready-for-response” and tries to send the responses to the requesting modality. Another 24h time-out is setup for this. If the server is not able to send the commit response within this time frame, the commit request is removed from pending queue w/o further notice. The modality has to re-issue the Storage Commitment request in this case.

6.3 Sequencing of real World Activities

- The incoming Storage Commitment trigger is kept in the pending queue
- A trigger for long-term archival is derived from this. (24h default time-out until archiving done)
- Consecutive to archival, the server application will send commit response to the requesting modality. (another 24h default time-out until commit response done)

7 AE Specification Storage Commitment

7.1 Storage Commitment AE Specification

SIEMENS ACOM.net Server DICOM application provides Standard Conformance to the following DICOMV3.0SOPClass as an SCP:

SOP Class Name	SOP Class UID
Storage Commitment Push Model	1.2.840.10008.1.20.1

7.1.1 Association Establishment Policies

7.1.1.1 General

Consecutive to archival time there will be a "Response Time Span" where the Server DICOM Application checks all pending commit request for which Instances were archived and creates the related commit responses. The DICOM application will generate an Storage Commitment Response Identifier which references to all Instances of the processed job. Depending on the state of the referred Instances in the commit request the 'Referenced SOP Sequence' and, in case of archive failures, the 'Failed SOP Sequence' will be set. Then the Commit Response is then sent over a single opened association.

The default PDU size used will be 256 KB.

7.1.1.2 Number of Associations

The Siemens ACOM.net Server DICOM application initiates one associations for each storage commitment request being replied to. The requests are handled sequentially.

7.1.1.3 Asynchronous Nature

The ACOM.net Server DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

7.1.1.4 Implementation Identifying Information

Implementation Class UID	1.3.12.2.1107.5.4.11.1.1.42
Implementation Version Name	"ACOMNET_VC20A"

7.1.2 Association Initiation Policy

The ACOM.net Server DICOM Application Entity acts as a Service Class Provider (SCP) for the

- Storage Commitment Push Model Service Class.

To do so, the ACOM.net Server will issue a

- N-EVENT-REPORT DIMSE to respond to a received storage commitment request and the association was closed by the remote system prior to response.

7.1.2.1 Real World Activity – Storage Commitment

7.1.2.1.1 Associated Real-World Activity - Send Commit Response

Acting as an Storage Commitment Provider, the ACOM.net Server Storage Commitment AE received an Storage Commitment request, carried out the request, and is ready to send back the response, but the association is not open anymore. In this case it will by itself initiate an association to send the storage commitment response (N-EVENT-REPORT) to the SCU.

7.1.2.1.2 Proposed Presentation Contexts - Send Commitment Response

The Siemens ACOM.net Server DICOM application will propose Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

7.1.2.1.3 SOP Specific Conformance Statement - Send Commitment Response

Storage Media File-Set ID and UID Attributes will not be supported in the N-EVENT-REPORT primitive invoked by the Storage Commitment SCP.

The Storage Commitment SCP returns following status codes:

Service Status	**Meaning**	**Error Codes**
Failed	Not archived	8801
	“don’t archive” flag is set for one or more instances	8802
	One or more instances not found	0112
	UID conflict	0119
	Duplicate Transaction UID	0131
Success	Commitment successful	0000

7.1.3 Association Acceptance Policy

The ACOM.net Server DICOM Application Entity acts as a Service Class Provider (SCP) for the

- Storage Commitment Push Model Service Class (to proof commitment for storage of instances previously received).

To do so, the ACOM.net Server attempts to accept a

- N-ACTION DIMSE to receive a commitment request for the instance(s) included.

7.1.3.1 Associated Real-World Activity - Commit SCP

7.1.3.1.1 Associated Real-World Activity - Receive Commit Request

When receiving an Storage Commitment request the ACOM.net Server DICOM application will insert it into a pending queue, checks status of the referred instances and generates an archive request for the related Instances. The ACOM.net Server application is triggered by the begin of the "Response Time Span" and restarts the commitment check for each entry in the pending queue and creates the related response identifier.

7.1.3.1.2 Accepted Presentation Contexts - Receive Commit Request

The Siemens ACOM.net Server DICOM application will accept Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

7.1.3.1.3 SOP-specific Conformance Statement - Receive Commit Request

If the ACOM.net Server Storage Commitment Application is running in conjunction with an archive system, it will interact with this archive system in order to commit the storage of images. therefore the commit response will not occur unless one archive cycle has passed and all instances have been save-copied to near-line storage.

Note: Only one N-ACTION-RQ per association is currently supported by the Storage Commitment SCP.

Storage Media File-Set ID and UID Attributes will not be supported in the N-EVENT-REPORT primitive invoked by the Storage Commitment SCP.

8 Implementation Model Query / Retrieve

The query/retrieve service class defines an application-level class of services which facilitates the management of images and patient data against the well defined information model of DICOM and allows a DICOM AE to retrieve images from a remote DICOM node or to request a remote DICOM AE to initiate a transfer of images to another DICOM AE. The ACOM.net Server DICOM application supports the query/retrieve services in a SCP role only.

8.1 Application Data Flow Diagram

The ACOM.NET Server DICOM network implementation is a Windows 2003 Server application and acts as SCP for the query/retrieve network service.

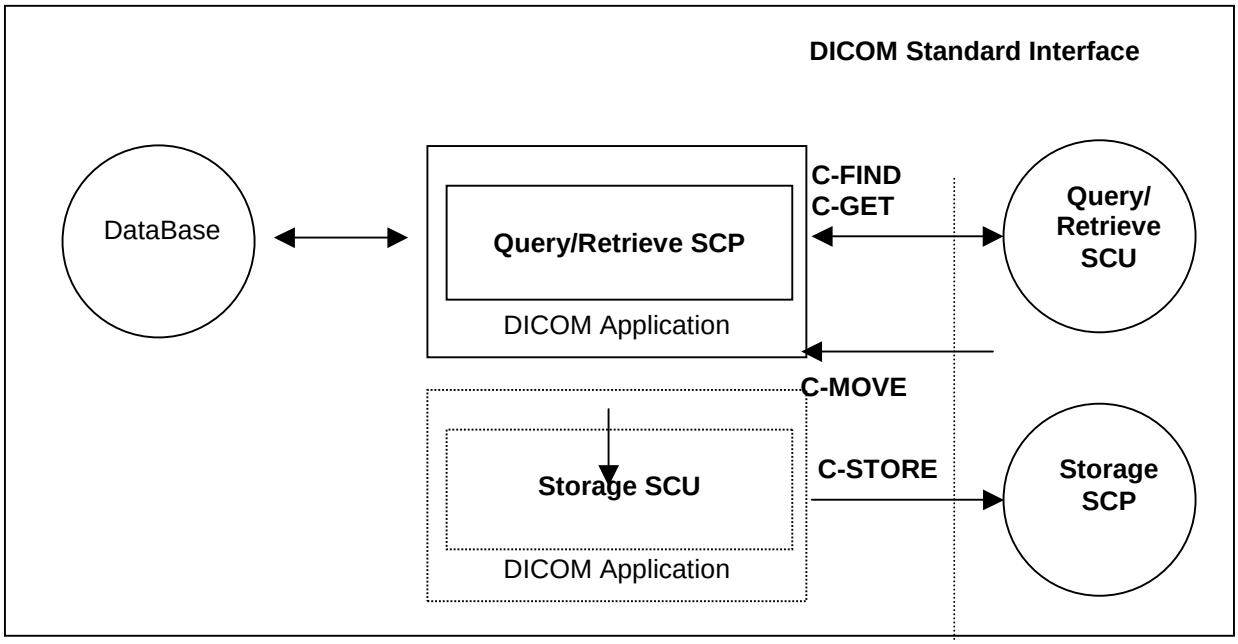


Figure 4: ACOM.NET Server Application Data Flow Diagram – Query/Retrieve SCP

8.2 Functional Definitions of Application Entities

The ACOM.net Server DICOM query/retrieve SCP responds to C-FIND DIMSE services from remote SCU and depending on further remote request - C-MOVE or C-GET - involves the Siemens ACOM.net Server DICOM application to initiate a C-STORE sub-operation (by triggering and parametrizing the own Storage SCU) to send image objects to a remote Storage SCP.

All components of the Siemens DICOM query/retrieve SCP application are operating as background Server processes. They are existing when the machine is powered on and then respond to queries based on the records stored in its database.

8.3 Sequencing of Real-World Activities

With the Query interface, all data (online, near-line, offline) can be accessed for searching and matching. Whereas retrieve of images (Instances) is only possible from **online** storage. Dedicated clients of the ACOM.net Server system have the capability to initiate transport requests for moving images from near-line to online storage. Currently this is not implemented via the Standard DICOM interface.

Any DICOM C-MOVE request on an IE that has subsequent instances stored "near-line" will trigger the Server to "move online" all these subsidiary level instances. Despite this implicit transfer trigger, the C-MOVE request will initially fail in this case.

9 Application Entity Specification Query/Retrieve

9.1 Query/Retrieve Service AEs Specification

The Query/Retrieve SCP responds to queries based on the records based on its database and images will be sent to the requesting SCU or to a different storage destination.

ACOM.NET Server DICOM products provide Standard Conformance to the following DICOM V3.0 SOP Classes as an SCP:

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Patient Root Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.1.3
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
Study Root Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.2.3
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1
Patient/Study Only Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2
Patient/Study Only Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.3.3

Supported Query/Retrieve SOP Classes as an SCP

Note: See also the Storage DICOM Conformance Statement of the Siemens ACOM.net Server DICOM application to compare for conformance of the C-STORE sub-operation generated by the C-GET/C-MOVE DIMSE services and compare also the Storage Service SOP classes described in the Storage DICOM Conformance Statement of the Modality to which the images shall be transferred to.

9.1.1 Association Establishment Policies

Not applicable. The ACOM.net Server has no means or User Interface to initiate Query/Retrieve Services.

9.1.2 Association Acceptance Policy

The ACOM.net Server DICOM application will accept associations for the following DIMSE-C operations as SCP:

- C-FIND
- C-GET
- C-MOVE
- C-FIND-CANCEL
- C-GET-CANCEL
- C-MOVE-CANCEL

Extended negotiation - which is relational retrieve - is NOT supported for the above listed services.

The ACOM.net Server Query Retrieve SCP will support multiple C-FIND requests over the same association, while multiple C-GET or C-MOVE requests over the same association are not supported.

9.1.2.1 Real-World Activity - Find SCP

9.1.2.1.1 Associated Real-World Activity - Find SCP

The associated Real-World activity is to respond query requests to an SCU with the query model Patient Root, Study Root and Patient/Study Only. Relational retrieve operation is NOT supported. With a C-FIND-CANCEL request the running query can be canceled at any time.

Multiple C-FIND requests over the same association are supported.

9.1.2.1.2 Accepted Presentation Contexts - Find SCP

The ACOM.net Server DICOM application will accept Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Study Root Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Patient/Study Only Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

Note: C-FIND Extended negotiation will NOT be supported.
The order of preference for accepting Transfer Syntaxes is: 1. Explict VR Little Endian, 2. Explicit VR Big Endian, 3. Implicit VR Little Endian.

9.1.2.1.3 SOP Specific Conformance Statement - Find SCP

The ACOM.net Server DICOM Query/Retrieve SCP supports hierarchical queries with all mandatory and optional search keys.

The query attribute contents will be treated case-sensitive.

With wildcard queries the symbol "?" is treated as "*" by the C-FIND SCP application. As a consequence the query string of "?abc*" will be processed as "*abc*".

If the value for the patient-level unique key "Patient ID" is not known, it may be returned with zero length. The attribute “Image Comments” will not be include in the C-FIND-RSP, if it is not set in the DB, even if it was requested as return key in the related C-FIND-RQ.

Usage of Storage Media File-Set ID, Retrieve AE Title and Instance Availability with C-FIND-RSP message:

- The *Storage Media File-Set ID* - if existent - can be returned at Study/Series/Image Level. Only on Image Level, the values of ONLINE, NEARLINE of OFFLINE are returned to indicate the Storage Location of the related Instance.

- The *Retrieve AE Title* - if existent - can only be returned at Image Level (for Patient Root and Study Root models) or Study Level (for Patient/Study Only model).

- The *Instance Availability* will be returned on Image Level. The values of ONLINE, NEARLINE of OFFLINE are returned to indicate the Storage Location of the related Instance.

Relational Queries are not supported.

A remote DICOM AE can cancel the running query by sending a C-FIND-CANCEL. Matches are possibly continuing (more C-FIND response with status PENDING) until the cancel operation has completed.

The supported attributes on the various query levels of the three supported information models are list in the tables of the following sections.

9.1.2.1.3.1 Patient Root Information Model

Attribute Name	Tag	Usage SCU	Matching
Patient Level			
Patient Name	(0010,0010)	R	Single value, Wildcard, universal
Patient ID	(0010,0020)	U	Single Value, Wildcard, universal
Patient’s Birth Date	(0010,0030)	O	Single Value, Range, universal
Patient’s Birth Time	(0010,0032)	O	Single Value, Range, universal
Patient’s Sex	(0010,0040)	O	Single Value, Wildcard, universal
Ethnic Group	(0010,2160)	O	Single Value, Wildcard, universal
Patient Comments	(0010,4000)	O	Wildcard, universal
Number of Patient related Studies	(0020,1200)	O	universal
Number of Patient related Series	(0020,1202)	O	universal
Number of Patient related Instances	(0020,1204)	O	universal
Study Level			
Study Instance UID	(0020,000D)	U	Single Value, List of UIDs
Study ID	(0020,0010)	R	Single Value, Wildcard, universal

Attribute Name	Tag	Usage SCU	Matching
Study Date	(0008,0020)	R	Single Value, Range, universal
Study Time	(0008,0030)	R	Single Value, Range, universal
Accession Number	(0008,0050)	R	Single Value, Wildcard, universal
Referring Physician´s Name	(0008,0090)	O	Single Value, Wildcard, universal
Study Description	(0008,1030)	O	Single Value, Wildcard, universal
Admitting Diagnosis Description	(0008,1080)	O	Single Value, Wildcard, universal
Patient's Age	(0010,1010)	O	Single Value, Wildcard, universal
Patient's Size	(0010,1020)	O	Single Value, universal
Patient's Weight	(0010,1030)	O	Single Value, universal
Occupation	(0010,2180)	O	Single Value, Wildcard, universal
Additional Patient History	(0010,21B0)	O	Wildcard, universal
Name of Physician reading the Study	(0008,1060)	O	Single Value, Wildcard, universal
Modalities in Study	(0008,0061)	O	Multiple values, universal
Number of Study Related Series	(0020,1206)	O	universal
Number of Study Related Instances	(0020,1208)	O	universal
Series Level			
Series Instance UID	(0020,000E)	U	Single Value, List of UIDs
Series Number	(0020,0011)	R	Single Value, universal
Modality	(0008,0060)	R	Single Value, Wildcard, universal
Laterality	(0020,0060)	O	Single Value, Wildcard, universal
Body Part Examined	(0018,0015)	O	Single Value, Wildcard, universal
Patient Position	(0018,5100)	O	Single Value, Wildcard, universal
Smallest Pixel Value in Series	(0028,0108)	O	Single Value, universal
Largest Pixel Value in Series	(0028,0109)	O	Single Value, universal
Protocol Name	(0018,1030)	O	Single Value, Wildcard, universal
Series Date	(0008,0021)	O	Single Value, Range, universal
Series Time	(0008,0031)	O	Single Value, Range, universal
Series Description	(0008,103E)	O	Single Value, Wildcard, universal
Operator's Name	(0008,1070)	O	Single Value, Wildcard, universal
Performing Physician's name	(0008,1050)	O	Single Value, Wildcard, universal
Performed Procedure Step Start Date	(0040,0244)	O	universal
Performed Procedure Step Start Time	(0040,0245)	O	universal
Number of Series related Instances	(0020,1209)	O	universal
Image Level			
SOP Instance UID	(0008,0018)	U	Single Value, List of UIDs
Image Number	(0020,0013)	R	Single Value, universal
Image Date	(0008,0023)	O	Single Value, Range, universal
Image Time	(0008,0033)	O	Single Value, Range, universal
Modality	(0008,0060)	O	Single Value, Wildcard, universal
Image Comments	(0020,4000)	O	universal

Supported Query attributes sorted by Query Level – Patient Root Information Model

9.1.2.1.3.2 Study Root Information Model

Attribute Name	Tag	Usage SCU	Matching
Study Level			
Patient Name	(0010,0010)	R	Single value, Wildcard, universal
Patient ID	(0010,0020)	R	Single Value, Wildcard, universal
Patient's Birth Date	(0010,0030)	O	Single Value, Range, universal
Patient's Birth Time	(0010,0032)	O	Single Value, Range, universal
Patient's Sex	(0010,0040)	O	Single Value, Wildcard, universal
Patient Comments	(0010,4000)	O	Wildcard, universal
Number of Patient related Studies	(0020,1200)	O	universal
Number of Patient related Series	(0020,1202)	O	universal
Number of Patient related Instances	(0020,1204)	O	universal
Study Instance UID	(0020,000D)	U	Single Value, List of UIDs
Study ID	(0020,0010)	R	Single Value, Wildcard, universal
Study Date	(0008,0020)	R	Single Value, Range, universal
Study Time	(0008,0030)	R	Single Value, Range, universal
Accession Number	(0008,0050)	R	Single Value, Wildcard, universal
Referring Physician's Name	(0008,0090)	O	Single Value, Wildcard, universal
Study Description	(0008,1030)	O	Single Value, Wildcard, universal
Admitting Diagnosis Description	(0008,1080)	O	Single Value, Wildcard, universal
Patient's Age	(0010,1010)	O	Single Value, Wildcard, universal
Patient's Size	(0010,1020)	O	Single Value, universal
Patient's Weight	(0010,1030)	O	Single Value, universal
Occupation	(0010,2180)	O	Single Value, Wildcard, universal
Additional Patient History	(0010,21B0)	O	Wildcard, universal
Name of Physician reading the Study	(0008,1060)	O	Single Value, Wildcard, universal
Modalities in Study	(0008,0061)	O	Multiple values, universal
Number of Study Related Series	(0020,1206)	O	universal
Number of Study Related Instances	(0020,1208)	O	universal
Series Level			
Series Instance UID	(0020,000E)	U	Single Value, List of UIDs
Series Number	(0020,0011)	R	Single Value, universal
Modality	(0008,0060)	R	Single Value, Wildcard, universal
Laterality	(0020,0060)	O	Single Value, Wildcard, universal
Body Part Examined	(0018,0015)	O	Single Value, Wildcard, universal
Patient Position	(0018,5100)	O	Single Value, Wildcard, universal
Smallest Pixel Value in Series	(0028,0108)	O	Single Value, universal
Largest Pixel Value in Series	(0028,0109)	O	Single Value, universal
Protocol Name	(0018,1030)	O	Single Value, Wildcard, universal
Series Date	(0008,0021)	O	Single Value, Range, universal

Attribute Name	Tag	Usage SCU	Matching
Series Time	(0008,0031)	O	Single Value, Range, universal
Series Description	(0008,103E)	O	Single Value, Wildcard, universal
Operator's Name	(0008,1070)	O	Single Value, Wildcard, universal
Performing Physician's Name	(0008,1050)	O	Single Value, Wildcard, universal
Performed Procedure Step Start Date	(0040,0244)	O	universal
Performed Procedure Step Start Time	(0040,0245)	O	universal
Number of Series related Instances	(0020,1209)	O	universal
Image Level			
SOP Instance UID	(0008,0018)	U	Single Value, List of UIDs
Image Number	(0020,0013)	R	Single Value, universal
Image Date	(0008,0023)	O	Single Value, Range, universal
Image Time	(0008,0033)	O	Single Value, Range, universal
Modality	(0008,0060)	O	Single Value, Wildcard, universal
Image Comments	(0020,4000)	O	universal

Supported Query attributes sorted by Query Level – Study Root Information Model

9.1.2.1.3.3 Patient/Study Only Information Model

Attribute Name	Tag	Usage SCU	Matching
Patient Level			
Patient Name	(0010,0010)	R	Single value, Wildcard, universal
Patient ID	(0010,0020)	U	Single Value, Wildcard, universal
Patient's Birth Date	(0010,0030)	O	Single Value, Range, universal
Patient's Birth Time	(0010,0032)	O	Single Value, Range, universal
Patient's Sex	(0010,0040)	O	Single Value, Wildcard, universal
Ethnic Group	(0010,2160)	O	Single Value, Wildcard, universal
Patient Comments	(0010,4000)	O	Wildcard, universal
Number of Patient related Studies	(0020,1200)	O	universal
Number of Patient related Series	(0020,1202)	O	universal
Number of Patient related Instances	(0020,1204)	O	universal
Study Level			
Study Instance UID	(0020,000D)	U	Single Value, List of UIDs
Study ID	(0020,0010)	R	Single Value, Wildcard, universal
Study Date	(0008,0020)	R	Single Value, Range, universal
Study Time	(0008,0030)	R	Single Value, Range, universal
Accession Number	(0008,0050)	R	Single Value, Wildcard, universal
Referring Physician's Name	(0008,0090)	O	Single Value, Wildcard, universal
Study Description	(0008,1030)	O	Single Value, Wildcard, universal
Admitting Diagnosis Description	(0008,1080)	O	Single Value, Wildcard, universal
Patient's Age	(0010,1010)	O	Single Value, Wildcard, universal
Patient's Size	(0010,1020)	O	Single Value, universal
Patient's Weight	(0010,1030)	O	Single Value, universal
Occupation	(0010,2180)	O	Single Value, Wildcard,

Attribute Name	Tag	Usage SCU	Matching
			universal
Additional Patient History	(0010,21B0)	O	Wildcard, universal
Name of Physician reading the Study	(0008,1060)	O	Single Value, Wildcard, universal
Modalities in Study	(0008,0061)	O	Multiple values, universal
Number of Study Related Series	(0020,1206)	O	universal
Number of Study Related Instances	(0020,1208)	O	universal

Supported Query attributes sorted by Query Level – Patient/Study Only Information Model

The Find SCP returns the following status codes:

Service Status	Meaning	Error Codes	Related Fields
Refused	Out of Resources	A700	(0000,0902)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	C001	(0000,0901) (0000,0902)
Cancel	Matching terminated due to Cancel request	FE00	None
Success	Matching is complete - No final Identifier is supplied	0000	None
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Identifier
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this identifier	FF01	Identifier

9.1.2.2 Real-World Activity - Get SCP

9.1.2.2.1 Associated Real-World Activity - Get SCP

The associated Real-World activity is to respond to retrieve requests initiated from a foreign SCU. The SCP supports the query model Patient Root, Study Root and Patient/Study Only. The Storage Service Class Conformance Statement describes the C-STORE service, which is generated by the C-GET service. Relational retrieve operation is NOT supported.

Multiple C-GET requests over the same association are NOT supported.

9.1.2.2.2 Accepted Presentation Contexts - Get SCP

The ACOM.net Server DICOM application will accept Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Model – GET	1.2.840.10008.5.1.4.1.2.1.3	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Study Root Query/Retrieve Model – GET	1.2.840.10008.5.1.4.1.2.2.3	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

Patient/Study Only Query/Retrieve Model – GET	1.2.840.10008.5.1.4.1.2.3.3	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

Note: C-GET Extended negotiation will NOT be supported.
The order of preference for accepting Transfer Syntaxes is: 1. Explicit VR Little Endian, 2. Explicit VR Big Endian, 3. Implicit VR Little Endian.

9.1.2.2.3 SOP Specific Conformance Statement - Get SCP

At association establishment time the C-GET presentation context must be negotiated along with the C-STORE sub-operations which must be accomplished on the same association as the C-GET operation. Relational retrieve operation is NOT supported.

All unique keys have to be supplied according to the selected Query/Retrieve Level. The related tables in the C-FIND SCP section will give information about "U" marked key attributes.

The Get SCP returns following status codes:

Service Status	Meaning	Error Codes	Related Fields
Refused	Out of Resources - Unable to calculate number of matches	A701	(0000,0902)
	Out of Resources - Unable to perform sub operations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	C001	(0000,0901) (0000,0902)
Cancel	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Warning	Sub-operations Complete - One or more Failures of Warnings	B000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Success	Sub-operations Complete - No Failures or Warning	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Pending	Sub-operations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

Only Images (Instances) from Online Storage can be retrieved via C-GET SCP. In case that retrieve is performed on instances that are "near-line", the retrieve request is denied, but all instances that are subsequent to the referred entity will be subject to a "bring online" request. So, depending on server load and archive bandwidth, the retrieve operation may lead to success if repeated at a later time.

9.1.2.3 Real-World Activity - Move SCP

9.1.2.3.1 Associated Real-World Activity - Move SCP

The associated Real-World activity is to respond to retrieve requests to an SCU. The SCP supports the query model Patient Root, Study Root and Patient/Study Only. The Storage Service Class Conformance Statement describes the C-STORE service, which is generated by the C-MOVE service. Relational retrieve operation is NOT supported.

Multiple C-MOVE requests over the same association are NOT supported.

9.1.2.3.2 Accepted Presentation Contexts - Move SCP

The ACOM.net Server DICOM application will accept Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Study Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Patient/Study Only Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

Note: C-MOVE Extended negotiation will NOT be supported.
The order of preference for accepting Transfer Syntaxes is: 1. Explicit VR Little Endian, 2. Explicit VR Big Endian, 3. Implicit VR Little Endian.

9.1.2.3.3 SOP Specific Conformance Statement - Move SCP

At association establishment time the C-MOVE presentation context shall be negotiated. The C-STORE sub-operations is done on a different association, specified in the C-MOVE request, to transfer images to a remote SCP of the Storage Service Class. Relational retrieve operation is NOT supported.

All unique keys have to be supplied according to the selected Query/Retrieve Level. The related tables in the C-FIND SCP section will give information about "U" marked key attributes.

The Move SCP returns following status codes:

Service Status	Meaning	Error Codes	Related Fields
Refused	Out of Resources - Unable to calculate number of matches	A701	(0000,0902)
	Out of Resources - Unable to perform sub operations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	C001	(0000,0901) (0000,0902)
Cancel	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Warning	Sub-operations Complete - One or more Failures of Warnings	B000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Success	Sub-operations Complete - No Failures or Warning	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

Service Status	Meaning	Error Codes	Related Fields
Pending	Sub-operations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

Only Images (Instances) from Online Storage can be retrieved via C-MOVE SCP. In case that retrieve is performed on instances that are "near-line", the retrieve request is denied, but all instances that are subsequent to the referred entity will be subject to a "bring online" request. So, depending on server load and archive bandwidth, the retrieve operation may lead to success if repeated at a later time.

10 Communication Profiles

10.1 Supported Communication Stacks

The ACOM.net Server DICOM application provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

10.1.1 TCP/IP Stack

The ACOM.net Server DICOM application uses the TCP/IP stack from the Windows OS upon which it executes. It uses the MergeCOM-3 subroutine library from Merge Technologies Inc.

10.1.1.1 API

The ACOM.net Server DICOM application uses the MergeCOM library that is based on a TCP/IP socket interface.

10.1.1.2 Physical Media Support

The ACOM.net Server DICOM application is indifferent to the physical medium over which TCP/IP executes; it inherits this from the Windows OS upon which it executes.

11 Extensions / Specializations / Privatizations

11.1.1 Standard Extended / Specialized / Private SOPs

Please refer to Annex for all information on these topics. A detailed overview is given there.

11.1.2 Private Transfer Syntaxes

Not applicable

12 Configuration

12.1 AE Title/Presentation Address Mapping

To ensure unique identification within the network the hostname should be used as part of the AE Titles (see examples below, sample hostname = acnserv1). The string can be up to 16 characters long and must not contain any extended characters, only 7-bit ASCII characters (excluding Control Characters) are allowed according to DICOM Standard.

Note: The current implementation of syngo is more restrictive. Spaces and special characters (&<>") are not supported in the AE Title string.

12.1.1 DICOM Verification

The Verification Service uses the AE configuration of the DICOM Service that is checked with the C-ECHO message. e.g. Verification will use the Storage AE, if initiated to check the configuration of a remote DICOM node.

12.1.2 DICOM Storage AE Title

The DICOM Storage application provides the application entity title, which can be configured via Service UI:

e.g. STU_acnserv1

The port number is set to the fixed value of

104 (fixed value)

12.1.3 DICOM Query/Retrieve AE Title

The DICOM Query/Retrieve application uses the same Port number and Application Entity Title as the DICOM Storage AE.

12.2 Configurable Parameters

The Application Entity Titles, host names and port numbers are configured using the ACOM.net Server Service/Installation Tool. For each AET the list of services supported can be configured. For Storage Targets the supported Transfer Syntaxes can be pre-selected.

12.2.1 “auto forward” configuration

Up to three auto-forward destinations can be configured. For each destination the following data can be configured:

- path to a file share

or

- name, IP , AET and Port-Number of a DICOM Storage SCP destination

12.2.2 Storage, Storage Commitment and Query/Retrieve

The ACOM.net Server Service/Installation Tool can be used to set the AET's, port-numbers, host-names, IP-addresses and capabilities for the remote nodes (SCP's). The user can select transfer syntaxes, compression modes and query models for each SCP separately.

By setting up the Transfer Syntax capabilities of the configured DICOM destination a "compression type supported" is defined each, which determines the proposed transfer syntax in case that the C-STORE is initiated as a sub-operation of an incoming C-MOVE-RQ.
By convention, a value of

0 means: Only Uncompressed Transfer Syntax(es) are proposed,
1 means: Lossless Transfer Syntax is proposed, and
2 means that an JPEG Lossy Transfer Syntax is proposed.

One uncompressed transfer syntax will be proposed in any case.

The number of "Simultaneous DICOM associations" accepted/used can be configured in the range of 10 to 100 (default is 40).

For Storage Commitment, the "Commit to Archive Timeout", "Send Commit Response Timeout" and "Response Time Span" are configured in the Server Registry. Those are not accessible via Service UI, but can be changed for individual sites by experienced personnel.

HKEY_LOCAL_MACHINE = <HKLM>

- <HKLM>\Software\Siemens\ACOMnet\AcnStuInterface\WaitTimeArchiveFlag
  Type: DWORD, Value: Time in SECONDS (86400 = 24h)
- <HKLM>\Software\Siemens\ACOMnet\AcnStuInterface\ResponseTimeSpan
  Type: STRING, Value: [hh:mm-hh:mm]
- <HKLM>\Software\Siemens\ACOMnet\AcnStuInterface\WaitTimeCommit
  Type: DWORD, Value: Time in SECONDS (86400 = 24h)

12.3 Default Parameters

This installation tool also uses some default parameters:

- Max. PDU size is set to 262144 Bytes (256 kB)
- Number of "Simultaneous DICOM associations": 40 (range 10 to 100)
- time-out for accepting/rejecting an association request: 60 s
- time-out for responding to an association open/close request: 60 s
- time-out for accepting a message over network: 60 s
- time-out for waiting for data between TCP/IP-packets: 60 s

The time-outs for waiting for a Service Request/Response message from the remote node are as follows:

- for Storage SCP/SCU: 600 s
- for Query/Retrieve SCP/SCU: 600 s

For Storage Commitment SCP:

- “Commit to Archive Timeout”: 24h (RegKey: WaitTimeArchiveFlag)
- “Send Commit Response Timeout”: 24h (RegKey: WaitTimeCommit)
- “Response Time Span”: 07:00 to 20:00

13 Support of Extended Character Sets

The Siemens ACOM.net Server DICOM application supports the ISO 8859 Latin 1 (ISO_IR 100) character set. This includes support of text display in browser and viewer of the related ACOM.net clients.

Any other character sets –well defined in DICOM- and especially the Japanese language character sets JIS X 0201 (ISO-IR 13 Japanese katakana and ISO-IR 14 Japanese romaji), JIS X 0208 (ISO-IR 87 Japanese kanji), JIS X 0212 (IOS-IR 159 Supplementary Japanese kanji) and Latin 1 character set with code extensions (ISO 2022 IR 100) are supported for image storage. This does not include support of all characters in the clients for proper text display in browser or image text during image viewing.

In case there is a mismatch between the SCS tags (0008,0005) and the characters in an IOD received by the system, then the following measures are taken to make the characters DICOM conform:

- Try to import with ISO_IR 100. If ISO_IR 100 fails, convert each illegal character to a ’?’.

A ANNEX

A.1 Siemens Private Syngo Non-Image IOD

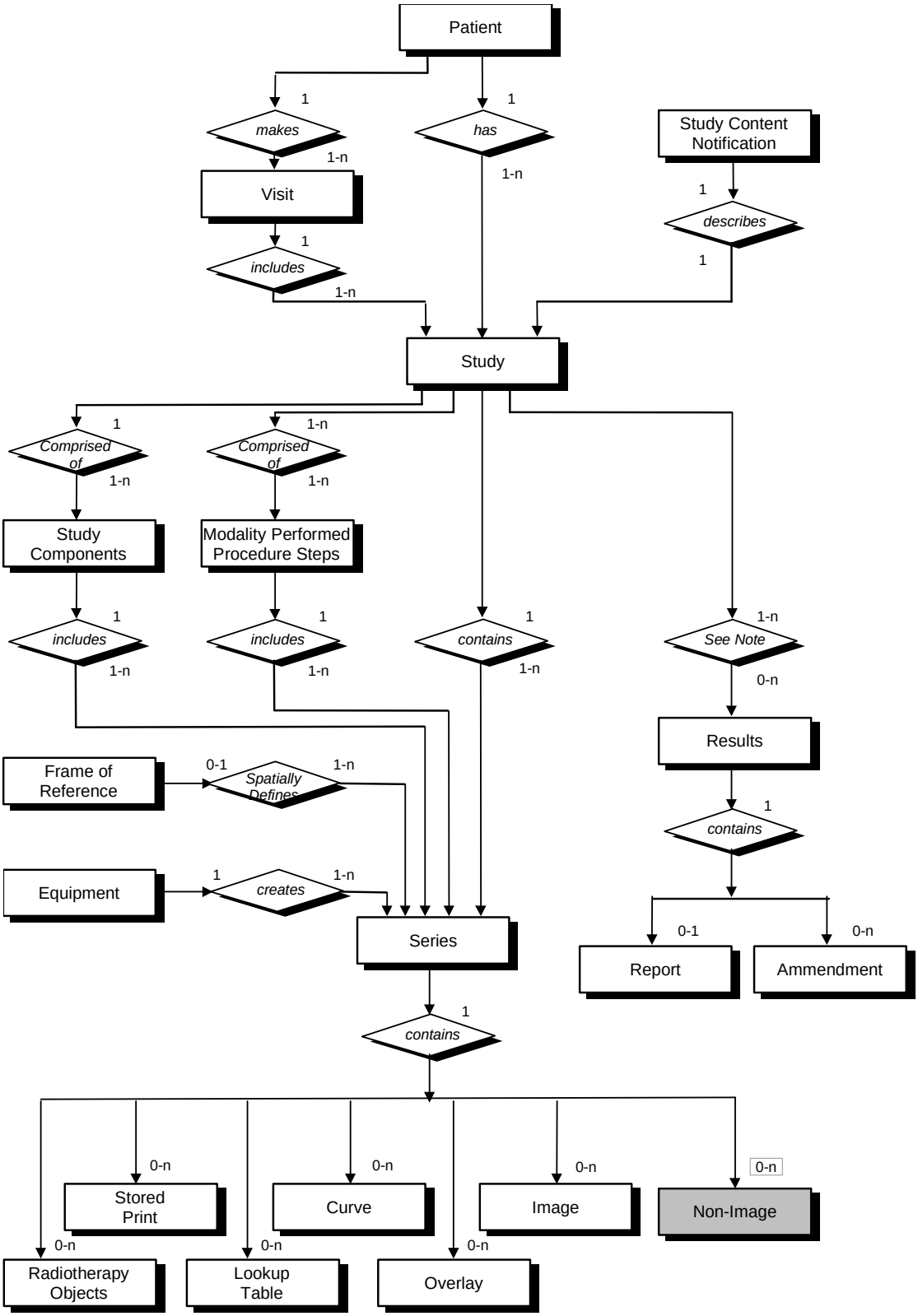
For encoding binary data-streams not representing image data, Siemens has created a private “syngo Non-Image IOD” according to the rules governed by the DICOM Standard. The following section will roll-out the definition of this Private IOD. It can be communicated with Network Storage Service and Offline Media Storage Services.

The Siemens “syngo Non-Image IOD” is identified by a private Non-Image Storage SOP Class UID of

“1.3.12.2.1107.5.9.1”

A.1.1 Siemens Syngo Non-Image IOD – E-R Model

The E-R model in A.1.2 depicts those components of the DICOM Information Model which directly refer to the Siemens Non-Image IOD. The Frame of Reference IE, Overlay IE, Modality Lookup-Table IE, VOI Lookup-Table IE and Curve IE are not components of the Siemens Non-Image IOD.


Patient
1
makes
1-n
Visit
1
includes
1-n
1
has
1-n
Study Content Notification
1
describes
1
Study
1
Comprised of
1-n
Study Components
1-n
Comprised of
1-n
Modality Performed Procedure Steps
1
includes
1-n
1
includes
1-n
1
contains
1-n
1-n
See Note
0-n
Results
1
contains
0-1
Report
0-n
Ammendment
Frame of Reference
0-1
Spatially Defines
1-n
Equipment
1
creates
1-n
Series
1
contains
0-n
Stored Print
0-n
Curve
0-n
Image
0-n
Non-Image
0-n
Radiotherapy Objects
0-n
Lookup Table
0-n
Overlay
0-n

A.1.2 Siemens Syngo Non-Image IOD – Module Table

IE	Module	Reference	Usage
Patient	Patient	[DICOM] PS3.3 C.7.1.1	M
Study	General Study	[DICOM] PS3.3 C.7.2.1	M
	Patient Study	[DICOM] PS3.3 C.7.2.2	U
Series	General Series	[DICOM] PS3.3 C.7.3.1	M
Equipment	General Equipment	[DICOM] PS3.3 C.7.5.1	U
CSA	CSA Image Header	A.2.1	U
	CSA Series Header	A.2.2	U
	MEDCOM Header	A.2.3	U
	CSA Non-Image	A.1.3.1	M
	SOP Common	[DICOM] PS3.3 C.12.1	M

A.1.3 Siemens Syngo Non-Image IOD – Modules

A.1.3.1 CSA Non-Image Module

The table in this section contains private IOD Attributes that describe CSA Non-Images.

Attribute Name	Tag	Owner	Type	Notes
Image Type	(0008,0008)	-	3	Image identification characteristics.
Acquisition Date	(0008,0022)	-	3	The date the acquisition of data that resulted in this data set started.
Acquisition Time	(0008,0023)	-	3	The time the acquisition of data that resulted in this data set started.
Conversion Type	(0008,0064)	-	3	Describes the kind of image conversion. Defined Terms: DV = Digitized Video, DI = Digital Interface, DF = Digitized Film, WSD = Workstation.
Referenced Image Sequence	(0008,1140)	-	3	A sequence, which provides reference to a set of Image SOP Class/Instance identifying other images significantly related to this data set. Encoded as sequence of items: (0008,1150) and (0008,1155).
Derivation Description	(0008,2111)	-	3	A text description of how this data set was derived.
Source Image Sequence	(0008,2112)	-	3	A Sequence which identifies the set of Image SOP Class/Instance pairs of the Images which were used to derive this data set. Zero or more Items may be included in this Sequence. Encoded as sequence of items: (0008,1150) and (0008,1155).
Patient Position	(0018,5100)	-	3	Patient position descriptor relative to the equipment
Acquisition Number	(0020,0012)	-	3	A number identifying the single continuous gathering of data over a period of time which resulted in this data set.
Image Number	(0020,0013)	-	3	A number that identifies this data set.
Frame of Reference UID	(0020,0052)	-	3	Uniquely identifies the frame of reference for a Series.
Image Comments	(0020,4000)	-	3	User-defined comments about the image (this data set).
Quality Control Image	(0028,0300)	-	3	Indicates whether or not this image is a quality control or phantom image. If this Attribute is absent,

				then the image may or may not be a quality control or phantom image. Enumerated Values: YES, NO.
Burned in Annotation	(0028,0301)	-	3	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired. If this Attribute is absent, then the image may or may not contain burned in annotation. Enumerated Values: YES, NO.
Lossy Image Compression	(0028,2110)	-	3	Specifies whether an Image has under-gone lossy compression. Enumerated Values: 00 = Image has NOT been subjected to lossy compression, 01 = Image has been subjected to lossy compression.
Lossy Image Compression Ratio	(0028,2112)	-	3	Describes the approximate lossy compression ratio(s) that have been applied to this image. May be multi valued if successive lossy compression steps have been applied.
CSA Data Type	(0029,xx08)	SIEMENS CSA NON-IMAGE	1	CSA Data identification characteristics. Defined Terms: BSR REPORT = Study Report Data
CSA Data Version	(0029,xx09)	SIEMENS CSA NON-IMAGE	3	Version of CSA Data Info (0029,xx10) format and CSA Non-Image Data (7FE1,xx10) format.
CSA Data Info	(0029,xx10)	SIEMENS CSA NON-IMAGE	3	Information to describe the CSA Data (7FE1,xx10).
CSA Data	(7FE1,xx10)	SIEMENS CSA NON-IMAGE	2	Binary data as byte stream.

A.2 Siemens Standard Extended Modules

IE	Module	Reference	Usage	Note
Image	CSA Image Header	A.2.1	U	private GG information
	CSA Series Header	A.2.2	U	
	MEDCOM Header	A.2.3	U	private *syngo* information
	Edge Enhancement Module	A.2.4	U	

U = user optional

A.2.1 CSA Image Header Module

The table in this section contains private IOD Attributes that describe the CSA Image Header:

Attribute Name	Tag	Owner	Type	Notes
CSA Image Header Type	(0029,xx08)	SIEMENS CSA HEADER	1	CSA Image Header identification characteristics. Defined Terms: NUM 4 = NUMARIS/4 SOM 5 = SOMARIS/5
CSA Image Header Version	(0029,xx09)	SIEMENS CSA HEADER	3	Version of CSA Image Header Info (0029,xx10) format.
CSA Image Header Info	(0029,xx10)	SIEMENS CSA HEADER	3	Manufacturer model dependent information.

A.2.2 CSA Series Header Module

The table in this section contains private IOD Attributes that describe the CSA Series Header:

Attribute Name	Tag	Owner	Type	Notes
CSA Series Header Type	(0029,xx18)	SIEMENS CSA HEADER	1	CSA Series Header identification characteristics. Defined Terms: NUM 4 = NUMARIS/4
CSA Series Header Version	(0029,xx19)	SIEMENS CSA HEADER	3	Version of CSA Series Header Info (0029,xx10) format.
CSA Series Header Info	(0029,xx20)	SIEMENS CSA HEADER	3	Manufacturer model dependent information.

A.2.3 MEDCOM Header Module

The table in this section contains private IOD Attributes that describe MEDCOM Header:

Attribute Name	Tag	Owner	Type	Notes
MedCom Header Type	(0029,xx08)	SIEMENS MEDCOM HEADER	1C	MedCom Header identification characteristics. Defined Terms: MEDCOM 1 (Required if MedCom Header Info (0029,xx10) present.)
MedCom Header Version	(0029,xx09)	SIEMENS MEDCOM HEADER	2C	Version of MedCom Header Info (0029,xx10) format. (Required if MEDCOM Header Info (0029,xx10) present.)
MedCom Header Info	(0029,xx10)	SIEMENS MEDCOM HEADER	3	Manufacturer model dependent information. The value of the attribute MedCom Header Info (0029,xx10) can be build up in each user defined format.
MedCom History Information	(0029,xx20)	SIEMENS MEDCOM HEADER	3	MedCom defined Patient Registration history information. See A.2.3.1.
PMTF Information 1	(0029,xx31)	SIEMENS MEDCOM HEADER	3	Transformation Information
PMTF Information 2	(0029,xx32)	SIEMENS MEDCOM HEADER	3	Transformation Information
PMTF Information 3	(0029,xx33)	SIEMENS MEDCOM HEADER	3	Transformation Information
PMTF Information 4	(0029,xx34)	SIEMENS MEDCOM HEADER	3	Transformation Information
Application Header Sequence	(0029,xx40)	SIEMENS MEDCOM HEADER	3	Sequence of Application Header items. Zero or more items are possible.
>Application Header Type	(0029,xx41)	SIEMENS MEDCOM HEADER	1C	Application Header identification characteristics. Required, if Sequence is sent.
>Application Header ID	(0029,xx42)	SIEMENS MEDCOM HEADER	3	Identification of an application header
>Application Header Version	(0029,xx43)	SIEMENS MEDCOM HEADER	3	Version of CSA Series Header Info (0029,xx44) format.
>Application Header Info	(0029,xx44)	SIEMENS MEDCOM HEADER	3	Application dependent information.
Workflow Control Flags	(0029,xx50)	SIEMENS MEDCOM HEADER	3	Eight free definable flags.
Archive Management Flag Keep Online	(0029,xx51)	SIEMENS MEDCOM HEADER	3	Flag to control remote archive management system to keep the image always online (also when already archived). Enumerated Values: 00 = remote control not required 01 = keep image online
Archive Management Flag Do Not Archive	(0029,xx52)	SIEMENS MEDCOM HEADER	3	Flag to control remote archive management system not to archive the related image. Enumerated Values: 00 = remote control not required 01 = don't archive image
Image Location Status	(0029,xx53)	SIEMENS MEDCOM HEADER	3	Image location status to control retrieving.

				Defined Terms: ONLINE = retrieving has to be done as usual, NEARLINE = move request to SCP and delay according to value of Estimated Retrieve Time (0029,xx54), OFFLINE = invoking a retrieve operation initiates an operator request, INVALID = invoking a retrieve operation would always result in an error.
Estimated Retrieve Time	(0029,xx54)	SIEMENS MEDCOM HEADER	3	Estimated retrieve time in seconds. A value less then zero (< 0) indicates location is OFFLINE or INVALID.
Data Size of Retrieved Images	(0029,xx55)	SIEMENS MEDCOM HEADER	3	Data size of images in MByte.

A.2.3.1 MEDCOM History Information

The value of the attribute MEDCOM History Information (0029,xx20) is defined in the following way:

Part	Name	Type	Bytes	Notes
header	Identifier	string	32	Always “CSA HISTORY”
	Version	string	32	e.g. “V1.10”
>n Items	Class Name	string	64	
	Modification String	string	1024	

MEDCOM History Information

A.2.4 Edge Enhancement Module

The table in this section contains private IOD Attributes that describe the private edge Enhancement Sequence Module:

Attribute Name	Tag	Owner	Type	Notes
Standard Edge Enhancement Sequence	(0029,xx00)	CARDIO-D.R. 1.0	3	Standard formula according Dynaview Extentions (one or more items possible)
>Convolution Kernel Size	(0029,xx01)	CARDIO-D.R. 1.0	1C	x-/y-size value pair. Each value shall be greater or equal to 3. Required if Sequence is present
>Convolution Kernel Coefficients	(0029,xx02)	CARDIO-D.R. 1.0	1C	Row-by-row list of the kernel Coefficients. Required if Sequence is present
>Edge Enhancement Gain	(0029,xx03)	CARDIO-D.R. 1.0	1C	Applied Filter gain Factor. Range is from 0 to 100 Percent. Required if Sequence is present

A.3 Registry of DICOM Data Elements

Tag	Private Owner Code	Name	VR	VM
(0029,xx08)	SIEMENS CSA HEADER	CSA Image Header Type	CS	1
(0029,xx09)	SIEMENS CSA HEADER	CSA Image Header Version	LO	1
(0029,xx10)	SIEMENS CSA HEADER	CSA Image Header Info	OB	1
(0029,xx18)	SIEMENS CSA HEADER	CSA Series Header Type	CS	1

(0029,xx19)	SIEMENS CSA HEADER	CSA Series Header Version	LO	1
(0029,xx20)	SIEMENS CSA HEADER	CSA Series Header Info	OB	1
(0029,xx08)	SIEMENS CSA NON-IMAGE	CSA Data Type	CS	1
(0029,xx09)	SIEMENS CSA NON-IMAGE	CSA Data Version	LO	1
(0029,xx10)	SIEMENS CSA NON-IMAGE	CSA Data Info	OB	1
(0029,xx08)	SIEMENS MEDCOM HEADER	MedCom Header Type	CS	1
(0029,xx09)	SIEMENS MEDCOM HEADER	MedCom Header Version	LO	1
(0029,xx10)	SIEMENS MEDCOM HEADER	MedCom Header Info	OB	1
(0029,xx20)	SIEMENS MEDCOM HEADER	MedCom History Information	OB	1
(0029,xx31)	SIEMENS MEDCOM HEADER	PMTF Information 1	LO	1
(0029,xx32)	SIEMENS MEDCOM HEADER	PMTF Information 2	UL	1
(0029,xx33)	SIEMENS MEDCOM HEADER	PMTF Information 3	UL	1
(0029,xx34)	SIEMENS MEDCOM HEADER	PMTF Information 4	CS	1
(0029,xx40)	SIEMENS MEDCOM HEADER	Application Header Sequence	SQ	1
(0029,xx41)	SIEMENS MEDCOM HEADER	Application Header Type	CS	1
(0029,xx42)	SIEMENS MEDCOM HEADER	Application Header ID	LO	1
(0029,xx43)	SIEMENS MEDCOM HEADER	Application Header Version	LO	1
(0029,xx44)	SIEMENS MEDCOM HEADER	Application Header Info	OB	1
(0029,xx50)	SIEMENS MEDCOM HEADER	Workflow Control Flags	LO	8
(0029,xx51)	SIEMENS MEDCOM HEADER	Arch. Management Flag Keep Online	CS	1
(0029,xx52)	SIEMENS MEDCOM HEADER	Arch. Mgmnt Flag Do Not Archive	CS	1
(0029,xx53)	SIEMENS MEDCOM HEADER	Image Location Status	CS	1
(0029,xx54)	SIEMENS MEDCOM HEADER	Estimated Retrieve Time	DS	1
(0029,xx55)	SIEMENS MEDCOM HEADER	Data Size of Retrieved Images	DS	1
(0029,xx00)	CARDIO-D.R. 1.0	Standard Edge Enhancement Sequence	SQ	1
(0029,xx01)	CARDIO-D.R. 1.0	Convolution Kernel Size	US	2
(0029,xx02)	CARDIO-D.R. 1.0	Convolution Kernel Coefficients	US	1-n
(0029,xx03)	CARDIO-D.R. 1.0	Edge Enhancement Gain	FL	1
(7FE1,xx10)	SIEMENS CSA NON-IMAGE	CSA Data	OB	1

A.4 Supported/Mandatory Attributes - per IOD

A.4.1 XA-IOD

Server Transfer
A "M" indicates that this attribute or value is mandatory to enable Storage onto the Server (minimal Header requirement), while an "O" indicates that this attribute is known by the server and supported for value storage.
A "--" would indicate no support of the attribute or specific value at all.

Archive
A "M" indicates that this attribute needs to be set with value in order to grant storage on near-line (long-term) archive. Else the field is left intentionally blank. Attributes marked with a "*)" can be configured, if value is mandatory for enabling nearline (long- term) storage.

Client-Display
A "B" indicates an attribute being mandatory for correct and consistent display in the Browser while a "V" indicates that the attribute is required to enable image viewing. Combination "B,V" is possible, else the field is left intentionally blank

Client-Export
Some client(s) will have the possibility to export images by transforming them to a Standard Computer Graphics Format. An "M" indicates the attribute is mandatory to do the correct transformation. Else the field is left intentionally blank.

Attributes/Tags written in *Italics* are of type 1 and need to be supplied with correct values.

Dictionary of XA IOD Supported/Mandatory Attributes - Acceptance Criteria

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Specific Character Set	*(0008,0005)*	*ISO_IR 100 (Latin 1 alphabet) or <other value> or if attribute is absent, usage of default character-set is assumed.*	*O* *O* *O*		*V,B* *V(no text)* *V,B*	
Image Type	*(0008,0008)*	ORIGINAL\PRIMARY\SINGLE PLANE or ORIGINAL\PRIMARY\BIPLANE A ORIGINAL\PRIMARY\BIPLANE B	*O*		*B*	
SOP Class UID	*(0008,0016)*	*1.2.840.10008.5.1.4.1.1.12.1*	*M*	*M*	*V,B*	
SOP Instance UID	*(0008,0018)*		*M*	*M*	*B*	
Study Date	(0008,0020)	<yyyymmdd>	O	M		
Series Date	(0008,0021)	<yyyymmdd>	O			
Acquisition Date	(0008,0022)	<yyyymmdd>	O			
Image Date	(0008,0023)	<yyyymmdd>	O			
Study Time	(0008,0030)	<hhmmss>	O	M		
Series Time	(0008,0031)	<hhmmss>	O			
Acquisition Time	(0008,0032)	<hhmmss>	O			
Image Time	(0008,0033)	<hhmmss>	O			
Accession Number	(0008,0050)	(Correction via ACOM.net client is supported)	O	M *)		
Modality	*(0008,0060)*	*XA or RF*	*O*	*M*	*B*	
Manufacturer	(0008,0070)		O			
Institution Name	(0008,0080)		O			
Institution Address	(0008,0081)		O			
Referring Physician's Name	(0008,0090)		O			
Station Name	(0008,1010)		O			
Study Description	(0008,1030)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Series Description	(0008,103E)		O			
Institutional Department Name	(0008,1040)		O			
Physician(s) of Record	(0008,1048)		O			
Performing Physician's Name	(0008,1050)		O			
Name of Physician(s) Reading Study	(0008,1060)		O			
Operator's Name	(0008,1070)		O			
Admitting Diagnosis Description	(0008,1080)		O			
Manufacturer's Model Name	(0008,1090)		O			
Referenced Study Sequence	(0008,1110)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Study Component Sequence	(0008,1111)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Patient Sequence	(0008,1120)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Image Sequence	*(0008,1140)*	*(for Biplan = 3rd value of Image Type is BIPLAN A or BIPLAN B)*	*O*			
>Ref SOP Class UID	*(0008,1150)*	*1.2.840.10008.5.1.4.1.1.12.1*	*O*			
>Ref SOP Instance UID	*(0008,1155)*	*<UID of corresponding Plane>*	*O*			
Derivation Description	(0008,2111)		O			
Source Image Sequence	(0008,2112)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
>Ref Frame Number	(0008,1160)		--			
Start Trim	(0008,2142)		O			
Stop Trim	(0008,2143)		O			
Recommended Display Frame Rate	(0008,2144)		O			
Anatomic Region Sequence	(0008,2218)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Anatomic Region Modifier Sequence	(0008,2220)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Primary Anatomic Structure Sequence	(0008,2218)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Primary Anatomic Structure ModifierSequence	(0008,2220)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Patient's Name	(0010,0010)	(Correction via ACOM.net client is supported)	O	M *)		

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Patient ID	(0010,0020)	(Correction via ACOM.net client is supported)	O	M *)		
Patient's Birth Date	(0010,0030)	<yyyymmdd> or <yyyy.mm.dd> (Correction via ACOM.net client is supported)	O	M *)		
Patient's Birth Time	(0010,0032)	<hhmmss>	O			
Patient's Sex	(0010,0040)	M or F or O (Correction via ACOM.net client is supported)	O	M *)		
Other Patient's IDs	(0010,1000)		O			
Other Patient Names	(0010,1001)		O			
Patient's Age	(0010,1010)		O			
Patient's Size	(0010,1020)		O			
Patient's Weight	(0010,1030)		O			
Patient's Address	(0010,1040)		O			
Ethnic Group	(0010,2160)		O			
Occupation	(0010,2180)		O			
Additional Patient's History	(0010,21B0)		O			
Patient Comments	(0010,4000)		O			
Contrast Bolus Agent	(0018,0010)		O			
Contrast/Bolus Agent Sequence	(0018,0012)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
Contrast/Bolus Administration Route Sequence	(0018,0014)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Additional Drug Sequence	(0018,002A)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Body Part Examined	(0018,0015)		O			
Scan Options	(0018,0022)		O			
Interventional Therapy Sequence	(0018,0036)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Intervention Drug Stop Time	(0018,0027)		O			
>Interventional Drug Sequence	(0018,0029)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
>Intervention Drug Start Time	(0018,0035)		O			
>Interventional Status	(0018,0038)		O			
>Therapy Description	(0018,0039)		O			
>Administration Route Code Sequence	(0054,0302)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
>>Code Meaning	(0008,0104)		O			
Cine Rate	(0018,0040)		O			
KVP	(0018,0060)		O			
Effective Duration	(0018,0072)		O			
Device Serial Number	(0018,1000)		O			
Software Version	(0018,1020)		O			
Protocol Name	(0018,1030)		O			
Contrast/Bolus Route	(0018,1040)		O			
Contrast/Bolus Volume	(0018,1041)		O			
Contrast/Bolus Start Time	(0018,1042)		O			
Contrast/Bolus Stop Time	(0018,1043)		O			
Contrast/Bolus Total Dose	(0018,1044)		O			
Contrast Flow Rate(s)	(0018,1046)		O			
Contrast Flow Duration(s)	(0018,1047)		O			
Contrast Bolus Ingredient	(0018,1048)		O			
Contrast Bolus Ingredient Concentration	(0018,1049)		O			
Spatial Resolution	(0018,1050)		O			
Frame Time	(0018,1063)		O			
Frame Time Vector	(0018,1065)		O			
Frame Delay	(0018,1066)		O			
Distance Source to Detector	(0018,1110)		O			
Distance Source to Patient	(0018,1111)		O			
Estimated Radiographic Magnification Factor	(0018,1114)		O			
Table Motion	(0018,1134)	STATIC or DYNAMIC	O			
Table Vertical Increment	(0018,1135)		O			
Table Lateral Increment	(0018,1136)		O			
Table Longitudinal Increment	(0018,1137)		O			
Table Angle	(0018,1138)		O			
Field of View Shape	(0018,1147)	ROUND or RECTANGLE	O			
Field of View Dimension(s)	(0018,1149)		O			
Exposure Time	(0018,1150)		O			
X-Ray Tube Current	(0018,1151)		O			
Exposure	(0018,1152)		O			
Average Pulse Width	(0018,1154)		O			
Radiation Setting	*(0018,1155)*	*SC or GR*	*O*			
Radiation Mode	(0018,115A)	CONTINUOUS or PULSED	O			
Image Area Dose Product	(0018,115E)		O			
Type of Filters	(0018,1161)		O			
Intensifier Size	(0018,1162)		O			
Imager Pixel Spacing	(0018,1164)		O			
Grid	(0018,1166)	IN or NONE	O			
Focal Spot	(0018,1190)		O			
Date of last Calibration	(0018,1200)		O			
Time of last Calibration	(0018,1201)		O			
Actual Frame Duration	(0018,1242)		O			
Preferred Playback Sequencing	(0018,1244)		O			
Acquisition Device Processing Description	(0018,1400)		O			
Positioner Motion	(0018,1500)	STATIC or DYNAMIC	O			
Positioner Primary Angle	(0018,1510)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Positioner Secondary Angle	(0018,1511)		O			
Positioner Primary Angle Increment	(0018,1520)		O			
Positioner Secondary Angle Increment	(0018,1521)		O			
Detector Primary Angle	(0018,1530)		O			
Detector Secondary Angle	(0018,1531)		O			
Shutter Shape	(0018,1600)		O			
Shutter Left Vertical Edge	(0018,1602)		O			
Shutter Right Vertical Edge	(0018,1604)		O			
Shutter Upper Horizontal Edge	(0018,1606)		O			
Shutter Lower Horizontal Edge	(0018,1608)		O			
Center of Circular Shutter	(0018,1610)		O			
Radius of Circular Shutter	(0018,1612)		O			
Vertices of the Polygonal Shutter	(0018,1620)		O			
Collimator Shape	(0018,1700)		O			
Collimator Left Vertical Edge	(0018,1702)		O			
Collimator Right Vertical Edge	(0018,1704)		O			
Collimator Upper Horizontal Edge	(0018,1706)		O			
Collimator Lower Horizontal Edge	(0018,1708)		O			
Center of Circular Collimator	(0018,1710)		O			
Radius of Circular Collimator	(0018,1712)		O			
Vertices of the Polygonal Collimator	(0018,1720)		O			
Patient Position	(0018,5100)		O			
Study Instance UID	*(0020,000D)*		*M*	*M*	*B*	
Series Instance UID	*(0020,000E)*		*M*	*M*	*B*	
Study ID	(0020,0010)	(Correction via ACOM.net client is supported)	O	M *)		
Series Number	(0020,0011)		O	M		
Acquisition Number	(0020,0012)		O			
Image Number	(0020,0013)	(value needed for correct sorting)	O	M	B	
Patient Orientation	(0020,0020)		O			
Laterality	(0020,0060)		O			
Images in Acquisition	(0020,1002)		O			
Image Comments	(0020,4000)		O			
Samples per Pixel	*(0028,0002)*	*1*	*M*		*V*	*M*
Photometric Interpretation	*(0028,0004)*	*MONOCHROME2*	*M*		*V*	*M*
Number of Frames	*(0028,0008)*	*<actual number of frames>*	*O*		*V*	
Frame Increment Pointer	*(0028,0009)*	*00181063_H or 00181065_H*	*M*			
Rows	*(0028,0010)*		*M*		*$V_{(<=1024)}$*	*M*
Columns	*(0028,0011)*		*M*		*$V_{(<=1024)}$*	*M*
Pixel Aspect Ratio	*(0028,0034)*	*v-size/h-size or absent (1:1)*	*O*			
Bits Allocated	*(0028,0100)*	*8 or 16*	*M*		*V*	*M*
Bits Stored	*(0028,0101)*	*8 or* *10 or* *12*	*M* *O* *O*		*V* *$V_{(bitsclipped)}$* *$V_{(bitsclipped)}$*	*M*
High Bit	*(0028,0102)*	*7 or 9 or 11*	*M*		*V*	*M*
Pixel Representation	*(0028,0103)*	*0*	*M*		*V*	*M*
Smallest Image Pixel Value	(0028,0106)					

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Largest Image Pixel Value	(0028,0106)		O			
Smallest Image Pixel Value	(0028,0106)		O			
Largest Image Pixel Value	(0028,0106)		O			
Pixel Padding Value	(0028,0120)		O			
Pixel Intensity Relationship	*(0028,1040)*	*LIN or LOG*	*O*		*V (native)*	
Window Center	(0028,1050)	(value needed for correct display)	O		V	
Window Width	(0028,1051)	(value needed for correct display)	O		V	
Rescale Intercept	(0028,1052)		O			
Rescale Slope	(0028,1053)		O			
Rescale Type	(0028,1054)		O			
Window Center & Width Explanation	(0028,1055)		O			
Recommended Viewing Mode	(0028,1090)	NAT or SUB	O		Always NAT	
Lossy Image Compression	*(0028,2110)*	*00 or 01 or attribute absent*	*O*			
Modality LUT Sequence[a]	*(0028,3000)*	*(only when [0028,1040] is LOG)*	*O*			
>LUT Descriptor	*(0028,3002)*	*<num of LUT entries>, <first pixel val mapped>, <Entry bits alloc>*	*O*			
>LUT Explanation	(0028,3003)		O			
>Modality LUT Type	*(0028,3004)*	*US*	*O*			
>LUT Data	*(0028,3006)*	*<array of data, accord.descriptor>*	*O*			
VOI LUT Sequence	(0028,3010)		O			
>LUT Descriptor	(0028,3002)	<num of LUT entries>, <first pixel val mapped>, <Entry bits alloc>	O			
>LUT Data	(0028,3006)	<array of data, accord.descriptor>	O			
Representative Frame Number	(0028,6010)	value needed to create Icon Image, else black Icon Image!	M		V,B	
Frame Number of Interest	(0028,6020)		O			
Frame of Interest Description	(0028,6022)		O			
R Wave Pointer	(0028,6040)		O			
Mask Subtraction Sequence	(0028,6100)	(if subtraction can be applied)	O			
>Mask Operation	(0028,6101)	NONE or AVG_SUB	O		only NAT	
>Applicable Frame Range	(0028,6102)		O			
>Mask Frame Numbers	(0028,6110)	(only for AVG_SUB)	O			
>Contrast Frame Averaging	(0028,6112)		O			
>Mask Sub-pixel Shift	(0028,6114)		O			
>TID Offset	(0028,6120)		O			
>Mask Operations Explanations	(0028,6190)		O			
Study Comments	(0032,4000)		O			
Performed Procedure Step Start Date	(0040,0244)		O			
Performed Procedure Step Start Time	(0040,0245)		O			
Performed Procedure Step ID	(0040,0253)		O		B	
Performed Procedure Step Description	(0040,0254)		O			
Request Attributes Sequence	(0040,0275)		O			
>Scheduled Procedure Step Description	(0040,0007)		O			
>Scheduled Action Item Code Sequence	(0040,0008)		O			
>>Code Value	(0008,0100)		O			

[a] During display within ACOM.net clients the Modality LUT Sequence will not be used.

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
>>Coding Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
>Scheduled Procedure Step ID	(0040,0009)		O			
>Requested Procedure ID	(0040,1001)		O			
Calibration Image	(0050,0004)	YES or NO	O			
Device Sequence	(0050,0010)		O			
>Code Value	(0008,0100)		O			
>Coding Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Device Length	(0050,0014)		O			
>Device Diameter	(0050,0016)		O			
>Device Diameter Units	(0050,0017)		O			
>Device Volume	(0050,0018)		O			
>Inter-Marker Distance	(0050,0019)		O			
>Device Description	(0050,0020)		O			
Curve Dimensions	(50xx,0005)		O		V	
Number of Points	(50xx,0010)		O		V	
Type of Data	(50xx,0020)	ECG	O			
Curve Descriptions	(50xx,0022)		O			
Axis Units	(50xx,0030)		O		V	
Axis Labels	(50xx,0040)		O			
Data Value Representation	(50xx,0103)		O			
Minimum Coordinate Value	(50xx,0104)		O			
Maximum Coordinate Value	(50xx,0105)		O			
Curve Range	(50xx,0106)		O			
Curve Data Descriptor	(50xx,0110)		O		V	
Coordinate Start Value	(50xx,0112)		O			
Coordinate Step Value	(50xx,0114)		O		V	
Curve Label	(50xx,2500)		O			
Referenced Overlay Sequence	(50xx,2600)		O			
>Referenced SOP Class UID	(0008,1150)		O			
>Referenced SOP Instance UID	(0008,1155)		O			
>Referenced Overlay Group	(0008,2610)		--			
Curve Data	(50xx,3000)		O		V	
Overlay Rows	(60xx,0010)		O		V	
Overlay Columns	(60xx,0011)		O		V	
Number of Frames in Overlay	(60xx,0015)		O		V	
Overlay Description	(60xx,0022)		O			
Overlay Type	(60xx,0040)	G	O			
Overlay Subtype	(60xx,0045)		--			
Overlay Origin	(60xx,0050)		O		V	
Image Frame Origin	(60xx,0051)		O		V	
Overlay Bits Allocated	(60xx,0100)	16_d or 1_d(with [60xx,3000])	O		V	
Overlay Bit Position	(60xx,0102)	0 or 12_d or 13_d or 14_d or 15_d	O		V	
ROI Area	(60xx,1301)		O			
ROI Mean	(60xx,1302)		O			
ROI Standard Deviation	(60xx,1303)		O			
Overlay Label	(60xx,1500)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Overlay Data	[60xx,3000]		O		V	
Pixel Data	*(7FE0,0010)*		*M*	*M*	*V*	*M*

A.4.2 SC-IOD

Server Transfer
A "M" indicates that this attribute or value is mandatory to enable Storage onto the Server (minimal Header requirement), while an "O" indicates that this attribute is known by the server and supported for value storage.
A "--" would indicate no support of the attribute or specific value at all.

Archive
A "M" indicates that this attribute needs to be set with value in order to grant storage on near-line (long-term) archive. Else the field is left intentionally blank. Attributes marked with a “*)” can be configured, if value is mandatory for enabling nearline (long- term) storage.

Client-Display
A "B" indicates an attribute being mandatory for correct and consistent display in the Browser while a "V" indicates that the attribute is required to enable image viewing. Combination "B,V" is possible, else the field is left intentionally blank

Client-Export
Some client(s) will have the possibility to export images by transforming them to a Standard Computer Graphics Format. An "M" indicates the attribute is mandatory to do the correct transformation. Else the field is left intentionally blank.

Attributes/Tags written in *Italics* are of type 1 and need to be supplied with correct values.

Dictionary of SC IOD Supported/Mandatory Attributes - Acceptance Criteria

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Specific Character Set	*(0008,0005)*	*ISO_IR 100 (Latin 1 alphabet) or <other value> or if attribute is absent, usage of default character-set is assumed.*	*O* *O* *O*		*V,B* *V(no text)* *V,B*	
Image Type	(0008,0008)		O		B	
Instance Creation Date	(0008,0012)		O			
Instance Creation Time	(0008,0013)		O			
Instance Creator UID	(0008,0014)		O			
SOP Class UID	*(0008,0016)*	*1.2.840.10008.5.1.4.1.1.7*	*M*	*M*	*V,B*	
SOP Instance UID	*(0008,0018)*		*M*	*M*	*B*	
Study Date	(0008,0020)	<yyyymmdd>	O	M		
Series Date	(0008,0021)	<yyyymmdd>	O			
Acquisition Date	(0008,0022)	<yyyymmdd>	O			
Image Date	(0008,0023)	<yyyymmdd>	O			
Study Time	(0008,0030)	<hhmmss>	O	M		
Series Time	(0008,0031)	<hhmmss>	O			
Acquisition Time	(0008,0032)	<hhmmss>	O			
Image Time	(0008,0033)	<hhmmss>	O			
Accession Number	(0008,0050)	(Correction via ACOM.net client is supported)	O	M *)		
Modality	(0008,0060)		O	M	B	

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Conversion Type	*(0008,0064)*		*M*			
Manufacturer	(0008,0070)		O			
Institution Name	(0008,0080)		O			
Institution Address	(0008,0081)		O			
Referring Physician's Name	(0008,0090)		O			
Station Name	(0008,1010)		O			
Study Description	(0008,1030)		O			
Series Description	(0008,103E)		O			
Institutional Department Name	(0008,1040)		O			
Physician(s) of Record	(0008,1048)		O			
Performing Physician's Name	(0008,1050)		O			
Name of Physician(s) Reading Study	(0008,1060)		O			
Operator's Name	(0008,1070)		O			
Admitting Diagnosis Description	(0008,1080)		O			
Manufacturer's Model Name	(0008,1090)		O			
Referenced Study Sequence	(0008,1110)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Study Component Sequence	(0008,1111)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Patient Sequence	(0008,1120)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Image Sequence	(0008,1140)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Derivation Description	(0008,2111)		O			
Source Image Sequence	(0008,2112)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
>Ref Frame Number	(0008,1160)		--			
Patient's Name	(0010,0010)	(Correction via ACOM.net client is supported)	O	M *)		
Patient ID	(0010,0020)	(Correction via ACOM.net client is supported)	O	M *)		
Patient's Birth Date	(0010,0030)	<yyyymmdd> or <yyyy.mm.dd> (Correction via ACOM.net client is supported)	O	M *)		
Patient's Birth Time	(0010,0032)	<hhmmss>	O			
Patient's Sex	(0010,0040)	M or F or O (Correction via ACOM.net client is supported)	O	M *)		
Other Patient's IDs	(0010,1000)		O			
Other Patient Names	(0010,1001)		O			
Patient's Age	(0010,1010)		O			
Patient's Size	(0010,1020)		O			
Patient's Weight	(0010,1030)		O			
Patient's Address	(0010,1040)		O			
Ethnic Group	(0010,2160)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Occupation	(0010,2180)		O			
Additional Patient's History	(0010,21B0)		O			
Patient Comments	(0010,4000)		O			
Body Part Examined	(0018,0015)		O			
Device Serial Number	(0018,1000)		O			
Secondary Capture Device ID	(0018,1010)		O			
Date of Secondary Capture	(0018,1012)		O			
Time of Secondary Capture	(0018,1014)		O			
Secondary Capture Device Manufacturer	(0018,1016)		O			
Secondary Capture Device Manufacturer's Model Name	(0018,1018)		O			
Secondary Capture Device Software Name	(0018,1019)		O			
Software Version	(0018,1020)		O			
Video Format Acquired	(0018,1022)		O			
Digital Image Format Acquired	(0018,1023)		O			
Protocol Name	(0018,1030)		O			
Spatial Resolution	(0018,1050)		O			
Date of last Calibration	(0018,1200)		O			
Time of last Calibration	(0018,1201)		O			
Patient Position	(0018,5100)		O			
Study Instance UID	*(0020,000D)*		*M*	*M*	*B*	
Series Instance UID	*(0020,000E)*		*M*	*M*	*B*	
Study ID	(0020,0010)	(Correction via ACOM.net client is supported)	O	M *)		
Series Number	(0020,0011)		O	M		
Acquisition Number	(0020,0012)		O			
Image Number	(0020,0013)	(value needed for correct sorting)	O	M	B	
Patient Orientation	(0020,0020)		O			
Laterality	(0020,0060)		O			
Images in Acquisition	(0020,1002)		O			
Image Comments	(0020,4000)		O			
Samples per Pixel	*(0028,0002)*	*1 or 3 (RGB)*	*M*		*V*	*M*
Photometric Interpretation	*(0028,0004)*	*MONOCHROME2* *MONOCHROME1* *RGB* *PALETTE COLOR*	*M* *O* *O* *O*		*V* *V* *V* *V*	*M*
Planar Configuration	*(0028,0006)*	*000 or 001*	*M*		*V*	*M*
Rows	*(0028,0010)*	*<=1280*	*M*		*V*	*M*
Columns	*(0028,0011)*	*<=1024*	*M*		*V*	*M*
Bits Allocated	*(0028,0100)*	*8,16 (MONOCHROMEx) or* *8 (PALETTE COLOR,RGB) or* *16 (PALETTE COLOR)*	*M* *O* *O*		*V* *V* *V*	*M*
Bits Stored	*(0028,0101)*	*8,10,12 (MONOCHROMEx) or* *8 (PALETTE COLOR,RGB) or* *16 (PALETTE COLOR)*	*M* *O* *O*		*V* *V* *V*	*M*
High Bit	*(0028,0102)*	*7 or 9 or 11 or 15*	*M*		*V*	*M*
Pixel Representation	*(0028,0103)*	*0*	*M*		*V*	*M*
Smallest Image Pixel Value	(0028,0106)		O			
Largest Image Pixel Value	(0028,0106)		O			
Smallest Image Pixel Value	(0028,0106)		O			
Largest Image Pixel Value	(0028,0106)		O			
Pixel Padding Value	(0028,0120)		O			
Window Center	(0028,1050)	(value needed for correct display)	O		V	

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Window Width	(0028,1051)	(value needed for correct display)	O		V	
Rescale Intercept	(0028,1052)		O			
Rescale Slope	(0028,1053)		O			
Rescale Type	(0028,1054)		O			
Window Center & Width Explanation	(0028,1055)		O			
Lossy Image Compression	(0028,2110)	00 or 01 or attribute absent	O			
Modality LUT Sequence[a]	(0028,3000)	(only when [0028,1040] is LOG)	O			
>LUT Descriptor	(0028,3002)	<num of LUT entries>, <first pixel val mapped>, <Entry bits alloc>	O			
>LUT Explanation	(0028,3003)		O			
>Modality LUT Type	(0028,3004)	US	O			
>LUT Data	(0028,3006)	<array of data, accord.descriptor>	O			
VOI LUT Sequence	(0028,3010)		O			
>LUT Descriptor	(0028,3002)	<num of LUT entries>, <first pixel val mapped>, <Entry bits alloc>	O			
>LUT Data	(0028,3006)	<array of data, accord.descriptor>	O			
Study Comments	(0032,4000)		O			
Performed Procedure Step Start Date	(0040,0244)		O			
Performed Procedure Step Start Time	(0040,0245)		O			
Performed Procedure Step ID	(0040,0253)		O		B	
Performed Procedure Step Description	(0040,0254)		O			
Request Attributes Sequence	(0040,0275)		O			
>Scheduled Procedure Step Description	(0040,0007)		O			
>Scheduled Action Item Code Sequence	(0040,0008)		O			
>>Code Value	(0008,0100)		O			
>>Coding Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
>Scheduled Procedure Step ID	(0040,0009)		O			
>Requested Procedure ID	(0040,1001)		O			
Overlay Rows	(60xx,0010)		O		V	
Overlay Columns	(60xx,0011)		O		V	
Overlay Description	(60xx,0022)		O			
Overlay Type	(60xx,0040)	G	O			
Overlay Subtype	(60xx,0045)		--			
Overlay Origin	(60xx,0050)		O		V	
Overlay Bits Allocated	(60xx,0100)	16_d or 1_d(with [60xx,3000])	O		V	
Overlay Bit Position	(60xx,0102)	0 or 12_d or 13_d or 14_d or 15_d	O		V	
ROI Area	(60xx,1301)		O			
ROI Mean	(60xx,1302)		O			
ROI Standard Deviation	(60xx,1303)		O			
Overlay Label	(60xx,1500)		O			
Overlay Data	[60xx,3000]		O		V	
Pixel Data	*(7FE0,0010)*		*M*	*M*	*V*	*M*

[a] During display within ACOM. net clients the Modality LUT Sequence will not be used.

A.4.3 NM-IOD

Server Transfer
A "M" indicates that this attribute or value is mandatory to enable Storage onto the Server (minimal Header requirement), while an "O" indicates that this attribute is known by the server and supported for value storage.
A "--" would indicate no support of the attribute or specific value at all.

Archive
A "M" indicates that this attribute needs to be set with value in order to grant storage on near-line (long-term) archive. Else the field is left intentionally blank. Attributes marked with a "*)" can be configured, if value is mandatory for enabling nearline (long- term) storage.

Client-Display
A "B" indicates an attribute being mandatory for correct and consistent display in the Browser while a "V" indicates that the attribute is required to enable image viewing. Combination "B,V" is possible, else the field is left intentionally blank

Client-Export
Some client(s) will have the possibility to export images by transforming them to a Standard Computer Graphics Format. An "M" indicates the attribute is mandatory to do the correct transformation. Else the field is left intentionally blank.

Attributes/Tags written in *Italics* are of type 1 and need to be supplied with correct values.

Dictionary of NM IOD Supported/Mandatory Attributes - Acceptance Criteria

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Specific Character Set	*(0008,0005)*	*ISO_IR 100 (Latin 1 alphabet) or* <*other value*> *or* *if attribute is absent, usage of default character-set is assumed.*	*O* *O* *O*		*V,B* *V(no text)* *V,B*	
Image Type	*(0008,0008)*		*O*		*B*	
SOP Class UID	*(0008,0016)*	*1.2.840.10008.5.1.4.1.1.20*	*M*	*M*	*V,B*	
SOP Instance UID	*(0008,0018)*		*M*	*M*	*B*	
Study Date	(0008,0020)	<yyyymmdd>	O	M		
Series Date	(0008,0021)	<yyyymmdd>	O			
Acquisition Date	(0008,0022)	<yyyymmdd>	O			
Image Date	(0008,0023)	<yyyymmdd>	O			
Study Time	(0008,0030)	<hhmmss>	O	M		
Series Time	(0008,0031)	<hhmmss>	O			
Acquisition Time	(0008,0032)	<hhmmss>	O			
Image Time	(0008,0033)	<hhmmss>	O			
Accession Number	(0008,0050)	(Correction via ACOM.net client is supported)	O	M *)		
Modality	*(0008,0060)*	*NM*	*O*	*M*	*B*	
Manufacturer	(0008,0070)		O			
Institution Name	(0008,0080)		O			
Institution Address	(0008,0081)		O			
Referring Physician's Name	(0008,0090)		O			
Station Name	(0008,1010)		O			
Study Description	(0008,1030)		O			
Series Description	(0008,103E)		O			
Institutional Department Name	(0008,1040)		O			
Physician(s) of Record	(0008,1048)		O			
Performing Physician's Name	(0008,1050)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Name of Physician(s) Reading Study	(0008,1060)		O			
Operator's Name	(0008,1070)		O			
Admitting Diagnosis Description	(0008,1080)		O			
Manufacturer's Model Name	(0008,1090)		O			
Referenced Study Sequence	(0008,1110)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Study Component Sequence	(0008,1111)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Patient Sequence	(0008,1120)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Overlay Sequence	(0008,1130)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Image Sequence	(0008,1140)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Curve Sequence	(0008,1145)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Derivation Description	(0008,2111)		O			
Source Image Sequence	(0008,2112)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
>Ref Frame Number	(0008,1160)		--			
Anatomic Region Sequence	(0008,2218)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Anatomic Region Modifier Sequence	(0008,2220)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Primary Anatomic Structure Sequence	(0008,2218)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Primary Anatomic Structure ModifierSequence	(0008,2220)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Patient's Name	(0010,0010)	(Correction via ACOM.net client is supported)	O	M *)		
Patient ID	(0010,0020)	(Correction via ACOM.net client is supported)	O	M *)		

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Patient's Birth Date	(0010,0030)	<yyyymmdd> or <yyyy.mm.dd> (Correction via ACOM.net client is supported)	O	M *)		
Patient's Birth Time	(0010,0032)	<hhmmss>	O			
Patient's Sex	(0010,0040)	M or F or O (Correction via ACOM.net client is supported)	O	M *)		
Other Patient's IDs	(0010,1000)		O			
Other Patient Names	(0010,1001)		O			
Patient's Age	(0010,1010)		O			
Patient's Size	(0010,1020)		O			
Patient's Weight	(0010,1030)		O			
Patient's Address	(0010,1040)		O			
Ethnic Group	(0010,2160)		O			
Occupation	(0010,2180)		O			
Additional Patient's History	(0010,21B0)		O			
Patient Comments	(0010,4000)		O			
Body Part Examined	(0018,0015)		O			
Intervention Drug Information Sequence	(0018,0026)		O			
>Intervention Drug Stop Time	(0018,0027)		O			
>Intervention Drug Dose	(0018,0028)		O			
>Interventional Drug Sequence	(0018,0029)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
>Intervention Drug Name	(0018,0034)		O			
>Intervention Drug Start Time	(0018,0035)		O			
>Administration Route Code Sequence	(0054,0302)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Slice Thickness	(0018,0050)		O			
Counts Accumulated	(0018,0070)		O			
Acquisition Termination Condition	(0018,0071)	CNTS or DENS or MANU or OVFL or TIME or TRIG	O			
Spacing between Slices	(0018,0088)		O			
Protocol Name	(0018,1030)		O			
Spatial Resolution	(0018,1050)		O			
Trigger Source or Type	(0018,1061)		O			
Beat Rejection Flag	(0018,1080)		O			
PVC Rejection	(0018,1085)		O			
Skip Beats	(0018,1086)		O			
Heart Rate	(0018,1088)		O			
Reconstruction Diameter	(0018,1100)		O			
Table Height	(0018,1130)		O			
Table Traverse	(0018,1131)		O			
Date of last Calibration	(0018,1200)		O			
Time of last Calibration	(0018,1201)		O			
Convolution Kernel	(0018,1210)		O			
Actual Frame Duration	(0018,1242)		O			
Count Rate	(0018,1243)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Scan Velocity	(0018,1300)		O			
Whole Body Technique	(0018,1301)		O			
Scan Length	(0018,1302)		O			
Processing Function	(0018,5020)		O			
Patient Position	(0018,5100)		O			
Study Instance UID	*(0020,000D)*		*M*	*M*	*B*	
Series Instance UID	*(0020,000E)*		*M*	*M*	*B*	
Study ID	(0020,0010)	(Correction via ACOM.net client is supported)	O	M *)		
Series Number	(0020,0011)		O	M		
Acquisition Number	(0020,0012)		O			
Image Number	(0020,0013)	(value needed for correct sorting)	O	M	B	
Patient Orientation	(0020,0020)		O			
Frame of Reference UID	*(0020,0052)*		*O*			
Laterality	(0020,0060)		O			
Images in Acquisition	(0020,1002)		O			
Position Reference Indicator	(0020,1040)		O			
Slice Location	(0020,1041)		O			
Image Comments	(0020,4000)		O			
Samples per Pixel	*(0028,0002)*	*1*	*M*		*V*	*M*
Photometric Interpretation	*(0028,0004)*	*MONOCHROME2* *PALETTE COLOR*	*M* *O*		*V* *V*	*M*
Number of Frames	*(0028,0008)*	*<actual number of frames>*	*O*		*V*	
Frame Increment Pointer	*(0028,0009)*		*M*			
Rows	*(0028,0010)*	*<=1024*	*M*		*V*	*M*
Columns	*(0028,0011)*	*<=1024*	*M*		*V*	*M*
Pixel Spacing	(0028,0030)		O			
Pixel Aspect Ratio	*(0028,0034)*	*v-size/h-size or absent (1:1)*	*O*			
Corrected Image	(0028,0051)		O			
Bits Allocated	*(0028,0100)*	*8,16 (MONOCHROME) or* *8 (PALETTE COLOR) or* *16 (PALETTE COLOR)*	*M* *O* *O*		*V* *V* *V*	*M*
Bits Stored	*(0028,0101)*	*8 or 16*	*M*		*V*	*M*
High Bit	*(0028,0102)*	*7 or 15*	*M*		*V*	*M*
Pixel Representation	*(0028,0103)*	*0*	*M*		*V*	*M*
Smallest Image Pixel Value	(0028,0106)		O			
Largest Image Pixel Value	(0028,0106)		O			
Smallest Image Pixel Value	(0028,0106)		O			
Largest Image Pixel Value	(0028,0106)		O			
Pixel Padding Value	(0028,0120)		O			
Window Center	(0028,1050)	(value needed for correct display)	O		V	
Window Width	(0028,1051)	(value needed for correct display)	O		V	
Window Center & Width Explanation	(0028,1055)		O			
Lossy Image Compression	(0028,2110)	00 or 01 or attribute absent	O			
VOI LUT Sequence	(0028,3010)		O			
>LUT Descriptor	(0028,3002)	<num of LUT entries>, <first pixel val mapped>, <Entry bits alloc>	O			
>LUT Data	(0028,3006)	<array of data, accord.descriptor>	O			
Study Comments	(0032,4000)		O			
Performed Procedure Step Start Date	(0040,0244)		O			
Performed Procedure Step Start Time	(0040,0245)		O			
Performed Procedure Step ID	(0040,0253)		O		B	

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Performed Procedure Step Description	(0040,0254)		O			
Request Attributes Sequence	(0040,0275)		O			
>Scheduled Procedure Step Description	(0040,0007)		O			
>Scheduled Action Item Code Sequence	(0040,0008)		O			
>>Code Value	(0008,0100)		O			
>>Coding Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
>Scheduled Procedure Step ID	(0040,0009)		O			
>Requested Procedure ID	(0040,1001)		O			
Energy Window Vector	(0054,0010)		O			
Number of Energy Windows	(0054,0011)		O			
Energy Window Information Sequence	(0054,0012)		O			
>Energy Window Range Sequence	(0054,0013)		O			
>>Energy Window Lower Limit	(0054,0014)		O			
>>Energy Window Upper Limit	(0054,0015)		O			
>Energy Window Name	(0054,0018)		O			
Radiopharmaceutical Information Sequence	(0054,0016)		O			
>Radiopharmaceutical	(0018,0031)		O			
>Radiopharmaceutical Route	(0018,1070)		O			
>Radiopharmaceutical Volume	(0018,1071)		O			
>Radiopharmaceutical Start Time	(0018,1072)		O			
>Radiopharmaceutical Stop Time	(0018,1073)		O			
>Radionuclide Total Dose	(0018,1074)		O			
>Radionuclide Code Sequence	(0054,0300)		O			
>>Code Value	(0008,0100)		O			
>>Coding Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
>Administration Route Code Sequence	(0054,0302)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
> Radiopharmaceutical Code Sequence	(0054,0304)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
>Calibration Data Sequence	(0054,0306)		O			
>>Syringe Counts	(0018,1045)		O			
>>Residual Syringe Counts	(0054,0017)		O			
>>Energy Window Number	(0054,0308)		O			
Detector Vector	(0054,0020)		O			
Number of Detectors	(0054,0021)		O			
Detector Information	(0054,0022)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Sequence						
>Distance Source to Detector	(0018,1110)		O			
>Gantry/Detector Tilt	(0018,1120)		O			
>Radial Position	(0018,1142)		O			
>Center of Rotation Offset	(0018,1145)		O			
>Field of View Shape	(0018,1147)		O			
>Field of View Dimension(s)	(0018,1149)		O			
>Collimator/Grid Name	(0018,1180)		O			
>Collimator Type	(0018,1181)		O			
>Focal Distance	(0018,1182)		O			
>X Focus Center	(0018,1183)		O			
>Y Focus Center	(0018,1184)		O			
>Image Position (Patient)	(0020,0032)		O			
>Image Orientation(Patient)	(0020,0037)		O			
>Zoom Factor	(0028,0031)		O			
>Zoom Center	(0028,0032)		O			
>Start Angle	(0054,0200)		O			
>View Code Sequence	(0054,0220)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
>>View Angulation Modifier Code Sequence	(0054,0222)		O			
>>>Code Value	(0008,0100)		O			
>>>Code Scheme Designator	(0008,0102)		O			
>>>Code Meaning	(0008,0104)		O			
Phase Vector	(0054,0030)		O			
Number of Phases	(0054,0031)		O			
Phase Information Sequence	(0054,0032)		O			
>Actual Frame Duration	(0018,1242)		O			
>Number of Frames in Phase	(0054,0033)		O			
>Phase Delay	(0054,0036)		O			
>Pause between Frames	(0054,0038)		O			
>Trigger Vector	(0054,0210)		O			
>Number of Triggers in Phase	(0054,0211)		O			
Rotation Vector	(0054,0050)		O			
Number of Rotations	(0054,0051)		O			
Rotation Information Sequence	(0054,0052)		O			
>Distance Source to Detector	(0018,1110)		O			
>Table Height	(0018,1130)		O			
>Table Traverse	(0018,1131)		O			
>Rotation Direction	(0018,1140)		O			
>Radial Position	(0018,1142)		O			
>Scan Arc	(0018,1143)		O			
>Angular Step	(0018,1144)		O			
>Actual Frame Duration	(0018,1242)		O			
>Number of Frames in Rotation	(0054,0053)		O			
>Start Angle	(0054,0200)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
R-R Interval Vector	(0054,0060)		O			
Number of R-R Intervals	(0054,0061)		O			
Gated Information Sequence	(0054,0062)		O			
>Trigger Time	(0018,1060)		O			
>Framing Type	(0018,1064)		O			
>Data Information Sequence	(0054,0063)		O			
>>Nominal Interval	(0018,1062)		O			
>>Frame Time	(0018,1063)		O			
>>Low R-R Value	(0018,1081)		O			
>>High R-R Value	(0018,1082)		O			
>>Intervals Acquired	(0018,1083)		O			
>>Intervals Rejected	(0018,1084)		O			
>>Time Slot Info Seq.	(0054,0072)		O			
>>>Time Slot Time	(0054,0073)		O			
Time Slot Vector	(0054,0070)		O			
Number of Time Slots	(0054,0071)		O			
Slice Vector	(0054,0080)		O			
Number of Slices	(0054,0081)		O			
Angular View Vector	(0054,0090)		O			
Time Slice Vector	(0054,0100)		O			
Type of Detector Motion	(0054,0202)		O			
Image ID	(0054,0400)		O			
Patient Orientation Code Sequence	(0054,0410)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
Patient Orientation Modifier Code Sequence	(0054,0412)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Patient Gantry Relationship Code Sequence	(0054,0410)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
Curve Dimensions	(50xx,0005)		O			
Number of Points	(50xx,0010)		O			
Type of Data	(50xx,0020)		O			
Curve Descriptions	(50xx,0022)		O			
Axis Units	(50xx,0030)		O			
Axis Labels	(50xx,0040)		O			
Data Value Representation	(50xx,0103)		O			
Minimum Coordinate Value	(50xx,0104)		O			
Maximum Coordinate Value	(50xx,0105)		O			
Curve Range	(50xx,0106)		O			
Curve Data Descriptor	(50xx,0110)		O			
Coordinate Start Value	(50xx,0112)		O			
Coordinate Step Value	(50xx,0114)		O			
Curve Label	(50xx,2500)		O			
Referenced Overlay	(50xx,2600)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Sequence						
>Referenced SOP Class UID	(0008,1150)		O			
>Referenced SOP Instance UID	(0008,1155)		O			
>Referenced Overlay Group	(0008,2610)		--			
Curve Data	(50xx,3000)		O			
Overlay Rows	(60xx,0010)		O		V	
Overlay Columns	(60xx,0011)		O		V	
Number of Frames in Overlay	(60xx,0015)		O		V	
Overlay Description	(60xx,0022)		O			
Overlay Type	(60xx,0040)	G	O			
Overlay Subtype	(60xx,0045)		--			
Overlay Origin	(60xx,0050)		O		V	
Image Frame Origin	(60xx,0051)		O		V	
Overlay Bits Allocated	(60xx,0100)	16_d or 1_d(with [60xx,3000])	O		V	
Overlay Bit Position	(60xx,0102)	0 or 12_d or 13_d or 14_d or 15_d	O		V	
ROI Area	(60xx,1301)		O			
ROI Mean	(60xx,1302)		O			
ROI Standard Deviation	(60xx,1303)		O			
Overlay Label	(60xx,1500)		O			
Overlay Data	[60xx,3000]		O		V	
Pixel Data	*(7FE0,0010)*	*compressed images w/o Offset Table have reduced frame- rate during review*	*M*	*M*	*V*	*M*

A.4.4 USmf-IOD

Server Transfer
A "M" indicates that this attribute or value is mandatory to enable Storage onto the Server (minimal Header requirement), while an "O" indicates that this attribute is known by the server and supported for value storage.
A "--" would indicate no support of the attribute or specific value at all.

Archive
A "M" indicates that this attribute needs to be set with value in order to grant storage on near-line (long-term) archive. Else the field is left intentionally blank. Attributes marked with a “*)” can be configured, if value is mandatory for enabling nearline (long- term) storage.

Client-Display
A "B" indicates an attribute being mandatory for correct and consistent display in the Browser while a "V" indicates that the attribute is required to enable image viewing. Combination "B,V" is possible, else the field is left intentionally blank

Client-Export
Some client(s) will have the possibility to export images by transforming them to a Standard Computer Graphics Format. An "M" indicates the attribute is mandatory to do the correct transformation. Else the field is left intentionally blank.

Attributes/Tags written in *Italics* are of type 1 and need to be supplied with correct values.

Dictionary of USmf IOD Supported/Mandatory Attributes - Acceptance Criteria

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Specific Character Set	*(0008,0005)*	*ISO_IR 100 (Latin 1 alphabet) or <other value> or if attribute is absent, usage of default character-set is assumed.*	*O* *O* *O*		*V,B* *V(no text)* *V,B*	
Image Type	*(0008,0008)*		*O*		*B*	
SOP Class UID	*(0008,0016)*	*1.2.840.10008.5.1.4.1.1.3.1*	*M*	*M*	*V,B*	
SOP Instance UID	*(0008,0018)*		*M*	*M*	*B*	
Study Date	(0008,0020)	<yyyymmdd>	O	M		
Series Date	(0008,0021)	<yyyymmdd>	O			
Acquisition Date	(0008,0022)	<yyyymmdd>	O			
Image Date	(0008,0023)	<yyyymmdd>	O			
Curve Date	(0008,0025)	<yyyymmdd>	O			
Study Time	(0008,0030)	<hhmmss>	O	M		
Series Time	(0008,0031)	<hhmmss>	O			
Acquisition Time	(0008,0032)	<hhmmss>	O			
Image Time	(0008,0033)	<hhmmss>	O			
Curve Time	(0008,0035)	<hhmmss>	O			
Accession Number	(0008,0050)	(Correction via ACOM.net client is supported)	O	M *)		
Modality	*(0008,0060)*	*US*	*O*	*M*	*B*	
Manufacturer	(0008,0070)		O			
Institution Name	(0008,0080)		O			
Institution Address	(0008,0081)		O			
Referring Physician's Name	(0008,0090)		O			
Station Name	(0008,1010)		O			
Study Description	(0008,1030)		O			
Series Description	(0008,103E)		O			
Institutional Department Name	(0008,1040)		O			
Physician(s) of Record	(0008,1048)		O			
Performing Physician's Name	(0008,1050)		O			
Name of Physician(s) Reading Study	(0008,1060)		O			
Operator's Name	(0008,1070)		O			
Admitting Diagnosis Description	(0008,1080)		O			
Manufacturer's Model Name	(0008,1090)		O			
Referenced Study Sequence	(0008,1110)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Study Component Sequence	(0008,1111)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Patient Sequence	(0008,1120)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Overlay Sequence	(0008,1130)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Image Sequence	(0008,1140)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Curve Sequence	(0008,1145)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Derivation Description	(0008,2111)		O			
Source Image Sequence	(0008,2112)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
>Ref Frame Number	(0008,1160)		--			
Stage Name	(0008,2120)		O			
Stage Number	(0008,2122)		O			
Number of Stages	(0008,2124)		O			
View Number	(0008,2128)		O			
Number of Event Timers	(0008,2129)		O			
Number of Views in Stage	(0008,212A)		O			
Event Elapsed Time(s)	(0008,2130)		O			
Event Timer Name(s)	(0008,2132)		O			
Start Trim	(0008,2142)		O			
Stop Trim	(0008,2143)		O			
Recommended Display Frame Rate	(0008,2144)		O			
Anatomic Region Sequence	(0008,2218)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Anatomic Region Modifier Sequence	(0008,2220)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Primary Anatomic Structure Sequence	(0008,2228)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Primary Anatomic Structure ModifierSequence	(0008,2230)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Transducer Position Sequence	(0008,2240)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Transducer Position Modifier Sequence	(0008,2242)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Transducer Orientation Sequence	(0008,2244)		O			
>Code Value	(0008,0100)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Transducer Orientation Modifier Sequence	(0008,2246)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Patient's Name	(0010,0010)	(Correction via ACOM.net client is supported)	O	M *)		
Patient ID	(0010,0020)	(Correction via ACOM.net client is supported)	O	M *)		
Patient's Birth Date	(0010,0030)	<yyyymmdd> or <yyyy.mm.dd> (Correction via ACOM.net client is supported)	O	M *)		
Patient's Birth Time	(0010,0032)	<hhmmss>	O			
Patient's Sex	(0010,0040)	M or F or O (Correction via ACOM.net client is supported)	O	M *)		
Other Patient's IDs	(0010,1000)		O			
Other Patient Names	(0010,1001)		O			
Patient's Age	(0010,1010)		O			
Patient's Size	(0010,1020)		O			
Patient's Weight	(0010,1030)		O			
Patient's Address	(0010,1040)		O			
Ethnic Group	(0010,2160)		O			
Occupation	(0010,2180)		O			
Additional Patient's History	(0010,21B0)		O			
Patient Comments	(0010,4000)		O			
Contrast Bolus Agent	(0018,0010)		O			
Contrast/Bolus Agent Sequence	(0018,0012)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
Contrast/Bolus Administration Route Sequence	(0018,0014)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Additional Drug Sequence	(0018,002A)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Body Part Examined	(0018,0015)		O			
Cine Rate	(0018,0040)		O			
Effective Duration	(0018,0072)		O			
Protocol Name	(0018,1030)		O			
Contrast/Bolus Route	(0018,1040)		O			
Contrast/Bolus Volume	(0018,1041)		O			
Contrast/Bolus Start Time	(0018,1042)		O			
Contrast/Bolus Stop Time	(0018,1043)		O			
Contrast/Bolus Total Dose	(0018,1044)		O			
Contrast Flow Rate(s)	(0018,1046)		O			
Contrast Flow Duration(s)	(0018,1047)		O			
Contrast Bolus Ingredient	(0018,1048)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Contrast Bolus Ingredient Concentration	(0018,1049)		O			
Spatial Resolution	(0018,1050)		O			
Trigger Time	(0018,1060)		O			
Nominal Interval	(0018,1062)		O			
Frame Time	(0018,1063)		O			
Frame Time Vector	(0018,1065)		O			
Frame Delay	(0018,1066)		O			
Beat Rejection Flag	(0018,1080)		O			
Low R-R Value	(0018,1081)		O			
High R-R Value	(0018,1082)		O			
Heart Rate	(0018,1088)		O			
Date of last Calibration	(0018,1200)		O			
Time of last Calibration	(0018,1201)		O			
Actual Frame Duration	(0018,1242)		O			
Preferred Playback Sequencing	(0018,1244)		O			
Output Power	(0018,5000)		O			
Transducer Data	(0018,5010)		O			
Focus Depth	(0018,5012)		O			
Preprocessing Function	(0018,5020)		O			
Mechanical Index	(0018,5022)		O			
Bone Thermal Index	(0018,5024)		O			
Cranial Thermal Index	(0018,5026)		O			
Soft Tissue Thermal Index	(0018,5027)		O			
Soft Tissue-focus Thermal Index	(0018,5028)		O			
Soft Tissue-surface Thermal Index	(0018,5029)		O			
Depth of Scan Field	(0018,5050)		O			
Image Transformation Matrix	(0018,5210)		O			
Image Translation Vector	(0018,5212)		O			
Sequence of Ultrasound Regions	(0018,6011)		O			
>Region Spatial Format	(0018,6012)		O			
>Region Data Type	(0018,6014)		O			
>Region Flags	(0018,6016)		O			
>Region Location Min x0	(0018,6018)		O			
>Region Location Min y0	(0018,601A)		O			
>Region Location Max x1	(0018,601C)		O			
>Region Location Max y1	(0018,601E)		O			
>Reference Pixel x0	(0018,6020)		O			
>Reference Pixel y0	(0018,6022)		O			
>Physical Units X direction	(0018,6024)		O			
>Physical Units Y direction	(0018,6026)		O			
>Ref. Pixel Phys. Value X	(0018,6028)		O			
>Ref. Pixel Phys. Value Y	(0018,602A)		O			
>Physical Delta X	(0018,602C)		O			
>Physical Delta Y	(0018,602E)		O			
>Transducer Frequency	(0018,6030)		O			
>Pulse Repetition Frequency	(0018,6032)		O			
>Doppler Correction Angle	(0018,6034)		O			
>Steering Angle	(0018,6036)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
>Doppler Sample Volume X Position	(0018,6038)		O			
>Doppler Sample Volume Y Position	(0018,603A)		O			
>TM-Line Position x0	(0018,603C)		O			
>TM-Line Position y0	(0018,603E)		O			
>TM-Line Position x1	(0018,6040)		O			
>TM-Line Position y1	(0018,6042)		O			
>Pixel Component Organization	(0018,6044)		O			
>Pixel Component Mask	(0018,6046)		O			
>Pixel Component Range Start	(0018,6048)		O			
>Pixel Component Range Stop	(0018,604A)		O			
>Pixel Component Physical Units	(0018,604C)		O			
>Pixel Component Data Type	(0018,604E)		O			
>Number of Table Break Points	(0018,6050)		O			
>Table of X Break Points	(0018,6052)		O			
>Table of Y Break Points	(0018,6054)		O			
>Number of Table Entries	(0018,6056)		O			
>Table of Pixel Values	(0018,6058)		O			
>Table of Parameter Values	(0018,605A)		O			
Region Location Min x0	(0018,6018)		O			
Region Location Min y0	(0018,601A)		O			
Region Location Max x1	(0018,601C)		O			
Region Location Max y1	(0018,601E)		O			
Reference Pixel x0	(0018,6020)		O			
Reference Pixel y0	(0018,6022)		O			
Physical Units X Direction	(0018,6024)		O			
Physical Units Y Direction	(0018,6026)		O			
Ref. Pixel Phys. Value X	(0018,6028)		O			
Ref. Pixel Phys. Value Y	(0018,602A)		O			
Physical Delta X	(0018,602C)		O			
Physical Delta Y	(0018,602E)		O			
Transducer Type	(0018,6031)		O			
Patient Position	(0018,5100)		O			
Study Instance UID	*(0020,000D)*		*M*	*M*	*B*	
Series Instance UID	*(0020,000E)*		*M*	*M*	*B*	
Study ID	(0020,0010)	(Correction via ACOM.net client is supported)	O	M *)		
Series Number	(0020,0011)		O	M		
Acquisition Number	(0020,0012)		O			
Image Number	(0020,0013)	(value needed for correct sorting)	O	M	B	
Patient Orientation	(0020,0020)		O			
Curve Number	(0020,0024)		O			
Frame of Reference UID	*(0020,0052)*		*O*			
Laterality	(0020,0060)		O			
Images in Acquisition	(0020,1002)		O			
Position Reference Indicator	(0020,1040)		O			
Image Comments	(0020,4000)		O			
Samples per Pixel	*(0028,0002)*	*1 or 3*	*M*		*V*	*M*
Photometric Interpretation	*(0028,0004)*	*MONOCHROME2*	*M*		*V(uncompr.)*	*M*

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
		PALETTE COLOR *RGB* *YBR_FULL* *YBR_FULL_422* *YBR_PARTIAL_422* *ARGB*	*O* *O* *O* *O* *O* --		*V* *V* *V* *V* -- --	
Planar Configuration	*(0028,0006)*	*000 or 001 (only RGB)*	*O*		*V*	*M*
Number of Frames	*(0028,0008)*	*<actual number of frames>*	*O*		*V*	
Frame Increment Pointer	*(0028,0009)*		*M*			
Rows	*(0028,0010)*	*<=3072*	*M*		*V*	*M*
Columns	*(0028,0011)*	*<=3072*	*M*		*V*	*M*
Ultrasound Color Data Present	(0028,0014)		O			
Pixel Aspect Ratio	*(0028,0034)*	*v-size/h-size or absent (1:1)*	*O*			
Bits Allocated	*(0028,0100)*	*8 or 16(PALETTE COLOR)*	*M*		*V*	*M*
Bits Stored	*(0028,0101)*	*8 or 16(PALETTE COLOR)*	*M*		*V*	*M*
High Bit	*(0028,0102)*	*7 or 15(PALETTE COLOR)*	*M*		*V*	*M*
Pixel Representation	*(0028,0103)*	*0*	*M*		*V*	*M*
Smallest Image Pixel Value	(0028,0106)		O			
Largest Image Pixel Value	(0028,0106)		O			
Smallest Image Pixel Value	(0028,0106)		O			
Largest Image Pixel Value	(0028,0106)		O			
Pixel Padding Value	(0028,0120)		O			
Window Center	(0028,1050)	(value needed for correct display)	O		V	
Window Width	(0028,1051)	(value needed for correct display)	O		V	
Window Center & Width Explanation	(0028,1055)		O			
Red Palette Color Lookup Table Descriptor	(0028,1101)		O			
Green Palette Color Lookup Table Descriptor	(0028,1102)		O			
Blue Palette Color Lookup Table Descriptor	(0028,1103)		O			
Palette Color Lookup Table UID	(0028,1199)		O			
Red Palette Color Lookup Table Data	(0028,1201)		O			
Green Palette Color Lookup Table Data	(0028,1202)		O			
Blue Palette Color Lookup Table Data	(0028,1203)		O			
Segmented Red Palette Color Lookup Table Data	(0028,1221)		O			
Segmented Green Palette Color Lookup Table Data	(0028,1222)		O			
Segmented Blue Palette Color Lookup Table Data	(0028,1223)		O			
Lossy Image Compression	(0028,2110)	00 or 01 or attribute absent	O			
VOI LUT Sequence	(0028,3010)		O			
>LUT Descriptor	(0028,3002)	<num of LUT entries>, <first pixel val mapped>, <Entry bits alloc>	O			
>LUT Data	(0028,3006)	<array of data, accord.descriptor>	O			
Study Comments	(0032,4000)		O			
Performed Procedure Step Start Date	(0040,0244)		O			
Performed Procedure Step Start Time	(0040,0245)		O			
Performed Procedure Step ID	(0040,0253)		O		B	
Performed Procedure Step Description	(0040,0254)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Request Attributes Sequence	(0040,0275)		O			
>Scheduled Procedure Step Description	(0040,0007)		O			
>Scheduled Action Item Code Sequence	(0040,0008)		O			
>>Code Value	(0008,0100)		O			
>>Coding Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
>Scheduled Procedure Step ID	(0040,0009)		O			
>Requested Procedure ID	(0040,1001)		O			
Curve Dimensions	(50xx,0005)		O			
Number of Points	(50xx,0010)		O			
Type of Data	(50xx,0020)		O			
Curve Descriptions	(50xx,0022)		O			
Axis Units	(50xx,0030)		O			
Axis Labels	(50xx,0040)		O			
Data Value Representation	(50xx,0103)		O			
Minimum Coordinate Value	(50xx,0104)		O			
Maximum Coordinate Value	(50xx,0105)		O			
Curve Range	(50xx,0106)		O			
Curve Data Descriptor	(50xx,0110)		O			
Coordinate Start Value	(50xx,0112)		O			
Coordinate Step Value	(50xx,0114)		O			
Audio Type	(50xx,2000)		O		--	
Audio Sample Format	(50xx,2002)		O		--	
Number of Channels	(50xx,2004)		O		--	
Number of Samples	(50xx,2006)		O		--	
Sample Rate	(50xx,2008)		O		--	
Total Time	(50xx,200A)		O		--	
Audio Sample Data	(50xx,200C)		O		--	
Audio Comments	(50xx,200E)		O		--	
Curve Label	(50xx,2500)		O			
Referenced Overlay Sequence	(50xx,2600)		O			
>Referenced SOP Class UID	(0008,1150)		O			
>Referenced SOP Instance UID	(0008,1155)		O			
>Referenced Overlay Group	(0008,2610)		--			
Curve Data	(50xx,3000)		O			
Overlay Rows	(60xx,0010)		O		V	
Overlay Columns	(60xx,0011)		O		V	
Number of Frames in Overlay	(60xx,0015)		O		V	
Overlay Description	(60xx,0022)		O			
Overlay Type	(60xx,0040)	G	O			
Overlay Subtype	(60xx,0045)		--			
Overlay Origin	(60xx,0050)		O		V	
Image Frame Origin	(60xx,0051)		O		V	
Overlay Bits Allocated	(60xx,0100)	16_d or 1_d(with [60xx,3000])	O		V	
Overlay Bit Position	(60xx,0102)	0 or 12_d or 13_d or 14_d or 15_d	O		V	
ROI Area	(60xx,1301)		O			
ROI Mean	(60xx,1302)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
ROI Standard Deviation	(60xx,1303)		O			
Overlay Label	(60xx,1500)		O			
Overlay Data	[60xx,3000]		O		V	
Pixel Data	*(7FE0,0010)*	*compressed images w/o Offset Table have reduced frame-rate during review*	*M*	*M*	*V*	*M*

A.4.5 US-IOD

Server Transfer
A "M" indicates that this attribute or value is mandatory to enable Storage onto the Server (minimal Header requirement), while an "O" indicates that this attribute is known by the server and supported for value storage.
A "--" would indicate no support of the attribute or specific value at all.

Archive
A "M" indicates that this attribute needs to be set with value in order to grant storage on near-line (long-term) archive. Else the field is left intentionally blank. Attributes marked with a “*)” can be configured, if value is mandatory for enabling nearline (long- term) storage.

Client-Display
A "B" indicates an attribute being mandatory for correct and consistent display in the Browser while a "V" indicates that the attribute is required to enable image viewing. Combination "B,V" is possible, else the field is left intentionally blank

Client-Export
Some client(s) will have the possibility to export images by transforming them to a Standard Computer Graphics Format. An "M" indicates the attribute is mandatory to do the correct transformation. Else the field is left intentionally blank.

Attributes/Tags written in *Italics* are of type 1 and need to be supplied with correct values.

Dictionary of US IOD Supported/Mandatory Attributes - Acceptance Criteria

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Specific Character Set	*(0008,0005)*	*ISO_IR 100 (Latin 1 alphabet) or <other value> or if attribute is absent, usage of default character-set is assumed.*	*O* *O* *O*		*V,B* *V(no text)* *V,B*	
Image Type	*(0008,0008)*		*O*		*B*	
SOP Class UID	*(0008,0016)*	*1.2.840.10008.5.1.4.1.1.6.1*	*M*	*M*	*V,B*	
SOP Instance UID	*(0008,0018)*		*M*	*M*	*B*	
Study Date	(0008,0020)	<yyyymmdd>	O	M		
Series Date	(0008,0021)	<yyyymmdd>	O			
Acquisition Date	(0008,0022)	<yyyymmdd>	O			
Image Date	(0008,0023)	<yyyymmdd>	O			
Curve Date	(0008,0025)	<yyyymmdd>	O			
Study Time	(0008,0030)	<hhmmss>	O	M		
Series Time	(0008,0031)	<hhmmss>	O			
Acquisition Time	(0008,0032)	<hhmmss>	O			
Image Time	(0008,0033)	<hhmmss>	O			
Curve Time	(0008,0035)	<hhmmss>	O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Accession Number	(0008,0050)	(Correction via ACOM.net client is supported)	O	M *)		
Modality	*(0008,0060)*	*US*	*O*	*M*	*B*	
Manufacturer	(0008,0070)		O			
Institution Name	(0008,0080)		O			
Institution Address	(0008,0081)		O			
Referring Physician's Name	(0008,0090)		O			
Station Name	(0008,1010)		O			
Study Description	(0008,1030)		O			
Series Description	(0008,103E)		O			
Institutional Department Name	(0008,1040)		O			
Physician(s) of Record	(0008,1048)		O			
Performing Physician's Name	(0008,1050)		O			
Name of Physician(s) Reading Study	(0008,1060)		O			
Operator's Name	(0008,1070)		O			
Admitting Diagnosis Description	(0008,1080)		O			
Manufacturer's Model Name	(0008,1090)		O			
Referenced Study Sequence	(0008,1110)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Study Component Sequence	(0008,1111)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Patient Sequence	(0008,1120)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Overlay Sequence	(0008,1130)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Image Sequence	(0008,1140)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Referenced Curve Sequence	(0008,1145)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
Derivation Description	(0008,2111)		O			
Source Image Sequence	(0008,2112)		O			
>Ref SOP Class UID	(0008,1150)		O			
>Ref SOP Instance UID	(0008,1155)		O			
>Ref Frame Number	(0008,1160)		--			
Stage Name	(0008,2120)		O			
Stage Number	(0008,2122)		O			
Number of Stages	(0008,2124)		O			
View Number	(0008,2128)		O			
Number of Event Timers	(0008,2129)		O			
Number of Views in Stage	(0008,212A)		O			
Event Elapsed Time(s)	(0008,2130)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Event Timer Name(s)	(0008,2132)		O			
Anatomic Region Sequence	(0008,2218)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Anatomic Region Modifier Sequence	(0008,2220)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Primary Anatomic Structure Sequence	(0008,2228)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Primary Anatomic Structure ModifierSequence	(0008,2230)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Transducer Position Sequence	(0008,2240)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Transducer Position Modifier Sequence	(0008,2242)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Transducer Orientation Sequence	(0008,2244)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Transducer Orientation Modifier Sequence	(0008,2246)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Patient's Name	(0010,0010)	(Correction via ACOM.net client is supported)	O	M *)		
Patient ID	(0010,0020)	(Correction via ACOM.net client is supported)	O	M *)		
Patient's Birth Date	(0010,0030)	<yyyymmdd> or <yyyy.mm.dd> (Correction via ACOM.net client is supported)	O	M *)		
Patient's Birth Time	(0010,0032)	<hhmmss>	O			
Patient's Sex	(0010,0040)	M or F or O (Correction via ACOM.net client is supported)	O	M *)		
Other Patient's IDs	(0010,1000)		O			
Other Patient Names	(0010,1001)		O			
Patient's Age	(0010,1010)		O			
Patient's Size	(0010,1020)		O			
Patient's Weight	(0010,1030)		O			
Patient's Address	(0010,1040)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Ethnic Group	(0010,2160)		O			
Occupation	(0010,2180)		O			
Additional Patient's History	(0010,21B0)		O			
Patient Comments	(0010,4000)		O			
Contrast Bolus Agent	(0018,0010)		O			
Contrast/Bolus Agent Sequence	(0018,0012)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
Contrast/Bolus Administration Route Sequence	(0018,0014)		O			
>Code Value	(0008,0100)		O			
>Code Scheme Designator	(0008,0102)		O			
>Code Meaning	(0008,0104)		O			
>Additional Drug Sequence	(0018,002A)		O			
>>Code Value	(0008,0100)		O			
>>Code Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
Body Part Examined	(0018,0015)		O			
Protocol Name	(0018,1030)		O			
Contrast/Bolus Route	(0018,1040)		O			
Contrast/Bolus Volume	(0018,1041)		O			
Contrast/Bolus Start Time	(0018,1042)		O			
Contrast/Bolus Stop Time	(0018,1043)		O			
Contrast/Bolus Total Dose	(0018,1044)		O			
Contrast Flow Rate(s)	(0018,1046)		O			
Contrast Flow Duration(s)	(0018,1047)		O			
Contrast Bolus Ingredient	(0018,1048)		O			
Contrast Bolus Ingredient Concentration	(0018,1049)		O			
Spatial Resolution	(0018,1050)		O			
Trigger Time	(0018,1060)		O			
Nominal Interval	(0018,1062)		O			
Beat Rejection Flag	(0018,1080)		O			
Low R-R Value	(0018,1081)		O			
High R-R Value	(0018,1082)		O			
Heart Rate	(0018,1088)		O			
Date of last Calibration	(0018,1200)		O			
Time of last Calibration	(0018,1201)		O			
Output Power	(0018,5000)		O			
Transducer Data	(0018,5010)		O			
Focus Depth	(0018,5012)		O			
Preprocessing Function	(0018,5020)		O			
Mechanical Index	(0018,5022)		O			
Bone Thermal Index	(0018,5024)		O			
Cranial Thermal Index	(0018,5026)		O			
Soft Tissue Thermal Index	(0018,5027)		O			
Soft Tissue-focus Thermal Index	(0018,5028)		O			
Soft Tissue-surface Thermal Index	(0018,5029)		O			
Depth of Scan Field	(0018,5050)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Image Transformation Matrix	(0018,5210)		O			
Image Translation Vector	(0018,5212)		O			
Sequence of Ultrasound Regions	(0018,6011)		O			
>Region Spatial Format	(0018,6012)		O			
>Region Data Type	(0018,6014)		O			
>Region Flags	(0018,6016)		O			
>Region Location Min x0	(0018,6018)		O			
>Region Location Min y0	(0018,601A)		O			
>Region Location Max x1	(0018,601C)		O			
>Region Location Max y1	(0018,601E)		O			
>Reference Pixel x0	(0018,6020)		O			
>Reference Pixel y0	(0018,6022)		O			
>Physical Units X direction	(0018,6024)		O			
>Physical Units Y direction	(0018,6026)		O			
>Ref. Pixel Phys. Value X	(0018,6028)		O			
>Ref. Pixel Phys. Value Y	(0018,602A)		O			
>Physical Delta X	(0018,602C)		O			
>Physical Delta Y	(0018,602E)		O			
>Transducer Frequency	(0018,6030)		O			
>Pulse Repetition Frequency	(0018,6032)		O			
>Doppler Correction Angle	(0018,6034)		O			
>Steering Angle	(0018,6036)		O			
>Doppler Sample Volume X Position	(0018,6038)		O			
>Doppler Sample Volume Y Position	(0018,603A)		O			
>TM-Line Position x0	(0018,603C)		O			
>TM-Line Position y0	(0018,603E)		O			
>TM-Line Position x1	(0018,6040)		O			
>TM-Line Position y1	(0018,6042)		O			
>Pixel Component Organization	(0018,6044)		O			
>Pixel Component Mask	(0018,6046)		O			
>Pixel Component Range Start	(0018,6048)		O			
>Pixel Component Range Stop	(0018,604A)		O			
>Pixel Component Physical Units	(0018,604C)		O			
>Pixel Component Data Type	(0018,604E)		O			
>Number of Table Break Points	(0018,6050)		O			
>Table of X Break Points	(0018,6052)		O			
>Table of Y Break Points	(0018,6054)		O			
>Number of Table Entries	(0018,6056)		O			
>Table of Pixel Values	(0018,6058)		O			
>Table of Parameter Values	(0018,605A)		O			
Region Location Min x0	(0018,6018)		O			
Region Location Min y0	(0018,601A)		O			
Region Location Max x1	(0018,601C)		O			
Region Location Max y1	(0018,601E)		O			
Reference Pixel x0	(0018,6020)		O			
Reference Pixel y0	(0018,6022)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Physical Units X Direction	(0018,6024)		O			
Physical Units Y Direction	(0018,6026)		O			
Ref. Pixel Phys. Value X	(0018,6028)		O			
Ref. Pixel Phys. Value Y	(0018,602A)		O			
Physical Delta X	(0018,602C)		O			
Physical Delta Y	(0018,602E)		O			
Transducer Type	(0018,6031)		O			
Patient Position	(0018,5100)		O			
Study Instance UID	*(0020,000D)*		*M*	*M*	*B*	
Series Instance UID	*(0020,000E)*		*M*	*M*	*B*	
Study ID	(0020,0010)	(Correction via ACOM.net client is supported)	O	M *)		
Series Number	(0020,0011)		O	M		
Acquisition Number	(0020,0012)		O			
Image Number	(0020,0013)	(value needed for correct sorting)	O	M	B	
Patient Orientation	(0020,0020)		O			
Curve Number	(0020,0024)		O			
Frame of Reference UID	*(0020,0052)*		*O*			
Laterality	(0020,0060)		O			
Images in Acquisition	(0020,1002)		O			
Position Reference Indicator	(0020,1040)		O			
Image Comments	(0020,4000)		O			
Samples per Pixel	*(0028,0002)*	*1 or 3*	*M*		*V*	*M*
Photometric Interpretation	*(0028,0004)*	*MONOCHROME2* *PALETTE COLOR* *RGB* *YBR_FULL* *YBR_FULL_422* *YBR_PARTIAL_422* *ARGB*	*M* *O* *O* *O* *O* *O* --		*V(uncompr.)* *V* *V* *V* *V* -- --	*M*
Planar Configuration	*(0028,0006)*	*000 or 001 (only RGB)*	*O*		*V*	*M*
Rows	*(0028,0010)*	*<=3072*	*M*		*V*	*M*
Columns	*(0028,0011)*	*<=3072*	*M*		*V*	*M*
Ultrasound Color Data Present	(0028,0014)		O			
Pixel Aspect Ratio	*(0028,0034)*	*v-size/h-size or absent (1:1)*	*O*			
Bits Allocated	*(0028,0100)*	*8 or 16(PALETTE COLOR)*	*M*		*V*	*M*
Bits Stored	*(0028,0101)*	*8 or 16(PALETTE COLOR)*	*M*		*V*	*M*
High Bit	*(0028,0102)*	*7 or 15(PALETTE COLOR)*	*M*		*V*	*M*
Pixel Representation	*(0028,0103)*	*0*	*M*		*V*	*M*
Smallest Image Pixel Value	(0028,0106)		O			
Largest Image Pixel Value	(0028,0106)		O			
Smallest Image Pixel Value	(0028,0106)		O			
Largest Image Pixel Value	(0028,0106)		O			
Pixel Padding Value	(0028,0120)		O			
Window Center	(0028,1050)	(value needed for correct display)	O		V	
Window Width	(0028,1051)	(value needed for correct display)	O		V	
Window Center & Width Explanation	(0028,1055)		O			
Red Palette Color Lookup Table Descriptor	(0028,1101)		O			
Green Palette Color Lookup Table Descriptor	(0028,1102)		O			
Blue Palette Color Lookup Table Descriptor	(0028,1103)		O			
Palette Color Lookup Table UID	(0028,1199)		O			

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Red Palette Color Lookup Table Data	(0028,1201)		O			
Green Palette Color Lookup Table Data	(0028,1202)		O			
Blue Palette Color Lookup Table Data	(0028,1203)		O			
Segmented Red Palette Color Lookup Table Data	(0028,1221)		O			
Segmented Green Palette Color Lookup Table Data	(0028,1222)		O			
Segmented Blue Palette Color Lookup Table Data	(0028,1223)		O			
Lossy Image Compression	(0028,2110)	00 or 01 or attribute absent	O			
VOI LUT Sequence	(0028,3010)		O			
>LUT Descriptor	(0028,3002)	<num of LUT entries>, <first pixel val mapped>, <Entry bits alloc>	O			
>LUT Data	(0028,3006)	<array of data, accord.descriptor>	O			
Study Comments	(0032,4000)		O			
Performed Procedure Step Start Date	(0040,0244)		O			
Performed Procedure Step Start Time	(0040,0245)		O			
Performed Procedure Step ID	(0040,0253)		O		B	
Performed Procedure Step Description	(0040,0254)		O			
Request Attributes Sequence	(0040,0275)		O			
>Scheduled Procedure Step Description	(0040,0007)		O			
>Scheduled Action Item Code Sequence	(0040,0008)		O			
>>Code Value	(0008,0100)		O			
>>Coding Scheme Designator	(0008,0102)		O			
>>Code Meaning	(0008,0104)		O			
>Scheduled Procedure Step ID	(0040,0009)		O			
>Requested Procedure ID	(0040,1001)		O			
Curve Dimensions	(50xx,0005)		O			
Number of Points	(50xx,0010)		O			
Type of Data	(50xx,0020)		O			
Curve Descriptions	(50xx,0022)		O			
Axis Units	(50xx,0030)		O			
Axis Labels	(50xx,0040)		O			
Data Value Representation	(50xx,0103)		O			
Minimum Coordinate Value	(50xx,0104)		O			
Maximum Coordinate Value	(50xx,0105)		O			
Curve Range	(50xx,0106)		O			
Curve Data Descriptor	(50xx,0110)		O			
Coordinate Start Value	(50xx,0112)		O			
Coordinate Step Value	(50xx,0114)		O			
Audio Type	(50xx,2000)		O		--	
Audio Sample Format	(50xx,2002)		O		--	
Number of Channels	(50xx,2004)		O		--	
Number of Samples	(50xx,2006)		O		--	
Sample Rate	(50xx,2008)		O		--	
Total Time	(50xx,200A)		O		--	
Audio Sample Data	(50xx,200C)		O		--	

Attribute Name	Tag	Comments	Server-Transfer	Archive	Client-Display	Client-Export
Audio Comments	(50xx,200E)		O		--	
Curve Label	(50xx,2500)		O			
Referenced Overlay Sequence	(50xx,2600)		O			
>Referenced SOP Class UID	(0008,1150)		O			
>Referenced SOP Instance UID	(0008,1155)		O			
>Referenced Overlay Group	(0008,2610)		--			
Curve Data	(50xx,3000)		O			
Overlay Rows	(60xx,0010)		O		V	
Overlay Columns	(60xx,0011)		O		V	
Overlay Description	(60xx,0022)		O			
Overlay Type	(60xx,0040)	G	O			
Overlay Subtype	(60xx,0045)		--			
Overlay Origin	(60xx,0050)	1,1	O		V	
Overlay Bits Allocated	(60xx,0100)	16_d or 1_d(with [60xx,3000])	O		V	
Overlay Bit Position	(60xx,0102)	0 or 12_d or 13_d or 14_d or 15_d	O		V	
ROI Area	(60xx,1301)		O			
ROI Mean	(60xx,1302)		O			
ROI Standard Deviation	(60xx,1303)		O			
Overlay Label	(60xx,1500)		O			
Overlay Data	[60xx,3000]		O		V	
Pixel Data	*(7FE0,0010)*	*compressed images w/o Offset Table have reduced frame-rate during review*	*M*	*M*	*V*	*M*